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Franck-Condon Factors, *R*-Centroids, Electronic Transition Moments, and Einstein Coefficients for Many Nitrogen and Oxygen Band Systems

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13. ABSTRACT *(Maximum 200 words)*
Air fluorescence models require accurate Franck-Condon factors and Einstein coefficients for analyzing the intensities of N_2, N_2^+, and O_2^+ emissions produced by electron bombardment of air, such as in the aurora, high-altitude nuclear explosions, and rocket-borne electron gun experiments. In our previous report, improved vibrational and rotational constants based on the latest available spectroscopic measurements for several excited and ionic states important in air fluorescence modeling were derived. These constants have been used in the present work to calculate band origins, Franck-Condon factors, and *r*-centroids for many band systems of nitrogen and oxygen. These results, together with electronic transition moments obtained from published papers or derived here from published emission data and measured upper-state lifetimes, have been used to compute Einstein coefficients by the *r*-centroid method. Einstein coefficients by integration of the product of the electronic transition moment function and vibrational wavefunctions have also been computed for comparison. For band systems involving "perturbed" electronic states, Einstein coefficients have been derived by simply normalizing published emission data to measured upper-state lifetimes. In this report, tables of band origin wavelengths and wavenumbers, Franck-Condon factors, *r*-cen-

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troids, electronic transition moments, and Einstein coefficients are presented for 17 N_2, N_2^+, and O_2^+ band systems. Plots of most of the electronic transition moment functions used in these calculations are also given. In addition, tables of Franck-Condon factors only are presented for 16 other band systems of nitrogen and oxygen, and tables of band wavelengths and Einstein coefficients are presented for 3 band systems having "perturbed" upper states.

PREFACE

The authors are grateful to J. M. Ajello, D. J. Burns, L. A. Collins, P. C. Cosby, G. K. James, S. R. Langhoff, B. Liu, H. Partridge, and J.-Y. Roncin for helpful discussions and correspondence and for providing reprints used as reference material in this report.

CONVERSION TABLE

Conversion factors for U.S. customary to metric (SI) units of measurement

(Symbols of SI units given in parentheses in middle column)

To convert from	To	Multiply by
angstrom (Å)	meters (m)	$1.000\ 000 \times 10^{-10}$
atmosphere (normal)	kilo pascal (kPa)	$1.013\ 25 \times 10^{2}$
bar	kilo pascal (kPa)	$1.000\ 000 \times 10^{2}$
barn	meters (m^2)	$1.000\ 000 \times 10^{-28}$
British thermal unit (thermochemical)	joule (J)	$1.054\ 350 \times 10^{3}$
calorie (thermochemical)	joule (J)	4.184 000
cal (thermochemical)/cm^2	mega joule/m^2 (MJ/m^2)	$4.184\ 000 \times 10^{-2}$
curie	giga Becquerel (GBq)*	$3.700\ 000 \times 10^{1}$
degree (angle)	radian (rad)	$1.745\ 329 \times 10^{-2}$
degree Fahrenheit (°F)	degree kelvin (K)	$T_K = (T_{°F} + 459.67)/1.8$
electron volt	joule (J)	$1.602\ 19 \times 10^{-19}$
erg	joule (J)	$1.000\ 000 \times 10^{-7}$
erg/second	watt (W)	$1.000\ 000 \times 10^{-7}$
foot	meter (m)	$3.048\ 000 \times 10^{-1}$
foot-pound-force	joule (J)	1.355 818
gallon (U.S. liquid)	meter^3 (m^3)	$3.785\ 412 \times 10^{-3}$
inch	meter (m)	$2.540\ 000 \times 10^{-2}$
jerk	joule (J)	$1.000\ 000 \times 10^{9}$
joule/kilogram (J/kg) (radiation dose absorbed)	Gray (Gy)**	1.000 000
kilotons	tera joules	4.183
kip (1000 lbf)	newton (N)	$4.448\ 222 \times 10^{3}$
kip/inch^2 (ksi)	kilo pascal (kPa)	$6.894\ 757 \times 10^{3}$
ktap	newton-second/m^2 (N-s/m^2)	$1.000\ 000 \times 10^{2}$
micron	meter (m)	$1.000\ 000 \times 10^{-6}$
mil	meter (m)	$2.540\ 000 \times 10^{-5}$
mile (international)	meter (m)	$1.609\ 344 \times 10^{3}$
ounce	kilogram (kg)	$2.834\ 952 \times 10^{-2}$
pound-force (lbf avoirdupois)	newton (N)	4.448 222
pound-force inch	newton-meter (N-m)	$1.129\ 848 \times 10^{-1}$
pound-force/inch	newton/meter (N/m)	$1.751\ 268 \times 10^{2}$
pound-force/foot^2	kilo pascal (kPa)	$4.788\ 026 \times 10^{-2}$
pound-force/inch^2 (psi)	kilo pascal (kPa)	6.894 757
pound-mass (lbm avoirdupois)	kilogram (kg)	$4.535\ 924 \times 10^{-1}$
pound-mass-foot^2 (moment of inertia)	kilogram-meter^2 (kg-m^2)	$4.214\ 011 \times 10^{-2}$
pound-mass/foot^3	kilogram/meter^3 (kg/m^3)	$1.601\ 846 \times 10^{1}$
rad (radiation dose absorbed)	Gray (Gy)**	$1.000\ 000 \times 10^{-2}$
roentgen	coulomb/kilogram (C/kg)	$2.579\ 760 \times 10^{-4}$
shake	second (s)	$1.000\ 000 \times 10^{-8}$
slug	kilogram (kg)	$1.459\ 390 \times 10^{1}$
torr (mm Hg, 0° C)	kilo pascal (kPa)	$1.333\ 22 \times 10^{-1}$

* The Becquerel (Bq) is the SI unit of radioactivity; 1 Bq = 1 event/s.

** The Gray (Gy) is the SI unit of absorbed radiation.

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SECTION 1
INTRODUCTION

Einstein coefficients (radiative transition probabilities) for molecular nitrogen and oxygen bands are useful for calculating the emission spectra produced by electron bombardment of air, such as occurs, for example, in the aurora (Meier, 1987), high-altitude nuclear explosions (Boquist and Snyder, 1967), and rocket-borne electron gun experiments (O'Neil *et al.*, 1978a; 1978b). Accurate values of these coefficients are required for predicting the intensities of N_2, N_2^+, and O_2^+ emissions, which dominate the air fluorescence spectrum. They are also useful for other applications, such as calculating the radiation from high-temperature air (Landshoff and Magee, 1969; Avilova *et al.*, 1969), and analyzing the emissions from gas discharges (Cramarossa *et al.*, 1974) and afterglows (Golde and Thrush, 1973).

It is possible to measure Einstein coefficients in the laboratory; however, because there are so many bands of interest, with wavelengths ranging from extreme ultraviolet to far infrared, it is impractical to measure them all individually. Instead, simplifying theoretical relations can be combined with limited experimental data to calculate Einstein coefficients for the large number of bands required. Such calculations are often based on the r-centroid approximation (e.g., Nicholls and Stewart, 1962). Einstein coefficients of different bands in a given band system are related to the vibrational overlap integrals, or Franck-Condon factors, and to the electronic transition moment, which can be approximated as a function of the expectation value of the internuclear distance, or r-centroid. The latter function can be derived from measured transition probabilities or band strengths of a few of the bands in the system. Franck-Condon factors are also useful for calculating the branching ratios for populating various vibrational levels when an electronic state is excited from the ground state by electron impact. This is based on the close relationship between transition probabilities in electron impact at high energies and radiation absorption for optically-allowed transitions (Lassettre, 1965; Lassettre *et al.*, 1965).

It is also possible to derive electronic transition moments from quantum-mechanical calculations, without use of band strength measurements. Such calculations are difficult, but have very recently attained an accuracy comparable to that of many band intensity measurements. They usually cover a wider range of internuclear distances than covered by the r-centroid method. Their accuracy can sometimes be

increased by multiplying the calculated transition moment by a constant correction factor based on a measurement of one band intensity or radiative lifetime.

Many Einstein coefficients, Franck-Condon factors, and r-centroids for nitrogen and oxygen band systems have been published previously. In a monograph on the spectrum of molecular oxygen, Krupenie (1972) compiled from various sources and tabulated many of these quantities for several oxygen band systems, including the A–X and b–a band systems of O_2^+, and several ionization systems of O_2. In a similar monograph on molecular nitrogen, Lofthus and Krupenie (1977) compiled and presented many of these quantities for several band systems of N_2 and N_2^+. More recently, Slanger (1986) tabulated Morse-potential Franck-Condon factors for the N_2 c_4'–a band system. James *et al.* (1988) tabulated Morse-potential Franck-Condon factors for the O_2^+ A–X band system and O_2^+ A–O_2 X ionization system. Green *et al.* (1988) tabulated RKR Franck-Condon factors and r-centroids for the N_2 B–A band system. Piper *et al.* (1989) tabulated Einstein coefficients for the N_2 B–A band system, which they calculated from their measured electronic transition moment function. Marinelli *et al.* (1988) tabulated Einstein coefficients for the N_2 a–X and a–a' band systems; however, later measurements of the a state lifetime by Marinelli *et al.* (1989) indicated that their a–X Einstein coefficients should be increased by about 35%. Ajello *et al.* (1989) tabulated Morse-potential Franck-Condon factors for the N_2 c_4'–X band system, and RKR Franck-Condon factors for several N_2 b'–X bands. Allen and Lin (1989) listed both RKR and Morse-potential Franck-Condon factors for a few N_2 c_4'–X bands. And finally, Allen *et al.* (1990) tabulated both RKR and Morse-potential Franck-Condon factors for the N_2 x–a', y–a', and y–w band systems.

However, the published literature falls far short of providing complete and accurate sets of radiative parameters for all of the band systems that contribute significantly to air fluorescence. In particular, values of Einstein coefficients and r-centroids are available for fewer than half of the band systems of interest. Moreover, many of the published values are based on older spectroscopic constants or radiative lifetimes that have been superseded by more recent measurements. In a previous report (Laher and Gilmore, 1991), the spectroscopic constants of the pertinent nitrogen and oxygen states were reviewed, and new constants for many of these states were derived. In the present work, these improved values have been employed to calculate new RKR potential curves and, thence, improved Franck-Condon factors and

r-centroids. Also, the available information on electronic transition moments has been examined, the best values determined or newly derived, and these used to calculate Einstein coefficients. The results from calculations employing both r-centroid and direct methods of computing Einstein coefficients are presented.

In addition, three band systems with "perturbed" upper electronic states are considered in this report. Einstein coefficients for these transitions cannot be calculated as simply as is possible for transitions involving unperturbed states. In these cases, the most practical alternative to a complex theoretical calculation is to derive Einstein coefficients from measured band intensities and radiative lifetimes. This is the approach that has been taken here.

SECTION 2
METHODS OF CALCULATION

2.1 RKR INTERNUCLEAR POTENTIAL ENERGY FUNCTIONS.

In the Rydberg-Klein-Rees (RKR) method of determining potential energy curves for diatomic molecules (Rydberg, 1931; Klein, 1932; Rees, 1947), the classical turning points are computed from experimental vibrational and rotational spectroscopic term values through the equations:

$$f(v) = \frac{h}{2\pi\sqrt{2\mu}} \int_{-1/2}^{v} [G(v) - G(v')]^{-1/2}\, dv', \tag{1}$$

and

$$g(v) = \frac{2\pi\sqrt{2\mu}}{h} \int_{-1/2}^{v} B_{v'}\, [G(v) - G(v')]^{-1/2}\, dv', \tag{2}$$

with the internuclear distances of the inner and outer turning points given by:

$$r_{\text{inner}},\ r_{\text{outer}} = (f/g + f^2)^{1/2} \mp f. \tag{3}$$

In the above equations, h is Planck's constant, μ is the reduced mass of the molecule, and $G(v)$ and B_v are mathematical expressions involving tabulated spectroscopic constants which give the experimentally determined vibrational energy and rotational constant at each vibrational quantum number v. In order to maintain high accuracy and remove the singularity that occurs at $v' = v$, the above equations have been integrated using a 16 point Gauss-Jacobi quadrature (Stroud and Secrest, 1966), as detailed by Tellinghuisen (1972).

These integrations yield the turning points at the value of the potential energy function $U(r)$ corresponding to the energy $G(v)$. As a result, $U(r)$ is determined at unequally-spaced values of internuclear distance r. In order to use this potential to calculate wave functions, it is necessary to interpolate it to equally-spaced values of r. In addition, it may be necessary to extrapolate the potential beyond the region derived from experimental data. Frequently, the interpolation is done with a high-order Lagrange polynomial (Zare, 1964), which, although cumbersome and computationally expensive, is stable for interpolation. Functional forms for

the repulsive and attractive potential segments may then be smoothly joined to the experimentally determined curve in order to extrapolate the potential energy into regions where the wave function becomes small. Typically the wave functions derived from the potential are not very sensitive to the choice of extrapolation segments used.

In the present work, an interpolation and extrapolation method based upon a Morse-type function has been used. This method has been found to yield results in excellent agreement with those produced by a seventh-order Lagrange interpolating polynomial, with a reduction in computation time by a factor of 3. The Morse potential function is given by:

$$U(r) = D_e\{1 - \exp[-\beta(r - r_e)]\}^2, \tag{4}$$

where D_e is the dissociation energy, β is a constant, and r_e is the equilibrium internuclear distance. Equation (4) can be inverted to yield an expression for the exponent:

$$L(r) \equiv -\beta(r - r_e) = \ln\left[1 \pm \sqrt{U(r)/D_e}\right], \tag{5}$$

where the upper sign is for $r < r_e$ and the lower for $r > r_e$. Substitution of the RKR values of $U(r)$ in equation (5) yields a set of values for β and, hence, through equation (4), a set of Morse potentials, each of which passes through one of the RKR points and has the correct curve minimum and dissociation limit. If the entire RKR curve agreed with a Morse potential, these calculated Morse potentials would coincide, and $L(r)$ would be a linear function of r. Due to deviations from the Morse potential, the calculated $L(r)$ behavior is not exactly linear, but its variation is gradual enough that linear interpolation between successive RKR values provides excellent accuracy. Similarly, linear extrapolation of $L(r)$ provides reasonable extensions of the RKR potential to somewhat larger and smaller internuclear separations.

For the calculations presented in this report, the molecular constants tabulated by Laher and Gilmore (1991) were used to compute r_e, T_e, $G(v)$, and B_v. The dissociation energy, D_e, for each state was determined by subtracting T_e from the energy of the dissociation limit. For most of the states of N_2 and N_2^+, and all of the states of O_2^+, this limit energy was calculated by adding the T_0 and D^0 values listed by Lofthus and Krupenie (1977) and Krupenie (1972), respectively.

However, for two of the higher states of N_2 and one of N_2^+ the listed D^0 values correspond to the onset of predissociation due to the "avoided crossing" of another potential curve (see Herzberg, 1950, p. 296). In employing equation (5) to calculate a potential curve below the avoided crossing, it is better to use a D_e value based on the noninteracting "diabatic" curve that goes to a higher dissociation limit. The molecular orbital configurations of these three states (Lofthus and Krupenie, 1977) suggest that the appropriate limits and energies (in cm^{-1}) are: N_2 $C\ ^3\Pi_u$, $^4S^0 + 2s2p^4\ ^4P$, 166850; N_2 $E\ ^3\Sigma_g^+$, $^4S^0 + 3s\ ^4P$, 162054; N_2^+ $C\ ^2\Sigma_u^+$, $^4S^0 + 2p^3\ ^5S^0$, 242725. Similarly, for the N_2 $D\ ^3\Sigma_u^+$ state, whose dissociation energy is not listed by Lofthus and Krupenie, the appropriate limit is $^4S^0 + 3s\ ^4P$, 162054.

2.2 WAVE FUNCTIONS, *R*-CENTROIDS, AND FRANCK-CONDON FACTORS.

The RKR potential energy derived above was used in the radial Schrödinger equation to solve for the rotationless vibrational wavefunctions, $\psi(r)$, where r is the internuclear distance. The numerical method of solution of the radial Schrödinger equation has been described by Cooley (1961); it employs the Numerov (1933) method of integration. Cooley's procedure also uses an improved formula for the correction of trial eigenvalues, based upon the second-order iteration-variation method of Löwdin (1958). Since the accuracy of this predictor-corrector formula does not depend critically upon a small step size being used in the radial coordinate, relatively few potential energy steps (1024) were used in the integration. A brief description of the Cooley method as well as an assessment of its accuracy and numerical stability may be found in the work of Cashion (1963). Using the computed vibrational wavefunctions, the Franck-Condon factors, $q_{v'v''}$, and r-centroids, $\bar{r}_{v'v''}$, were then calculated from their defining integrals (Fraser, 1954; Nicholls and Stewart, 1962):

$$q_{v'v''} = \left[\int \psi_{v'}^* \psi_{v''} dr\right]^2 , \tag{6}$$

$$\bar{r}_{v'v''} = \int \psi_{v'}^* r \psi_{v''} dr \Big/ \int \psi_{v'}^* \psi_{v''} dr , \tag{7}$$

by Simpson's rule integration, where the primes and double primes denote upper and lower states, respectively. Equation (7) shows that $\bar{r}_{v'v''}$ is a weighted mean of the internuclear distance for the (v'-v'') band, with the weighting function $\psi_{v'}^* \psi_{v''}$. However, unlike conventional weighting functions, $\psi_{v'}^* \psi_{v''}$ can change sign over the

integration range. Consequently, the denominator of equation (7) can become very small even when the numerator is not so small, so that the r-centroid can become very large, lying beyond the range of r where the wavefunctions are appreciable. For similar reasons, the r-centroid can also go negative. However, such large or negative values occur only when the denominator is quite small. In such a situation, the Franck-Condon factor, which equals the square of the denominator, is very small, and the band is correspondingly very weak and usually of little practical importance. Moreover, in such cases, the Franck-Condon factor and intensity often vary significantly with rotational quantum number, a variation which is conventionally neglected.

2.3 ELECTRONIC TRANSITION MOMENTS AND EINSTEIN COEFFICIENTS.

A diatomic electronic-vibrational transition may be expressed as

$$^{2S'+1}\Lambda'(v') \longrightarrow ^{2S''+1}\Lambda''(v''), \tag{8}$$

where S is the spin quantum number, and Λ is the electronic angular momentum quantum number (Λ values of 0, 1, 2, ... are indicated by the state symbols Σ, Π, Δ, ...).

In accordance with the definition established by Schadee (1978) and Whiting *et al.* (1980) for the electronic transition moment, the Einstein coefficient, $A_{v'v''}$ (in s^{-1}), for a transition in which $S' = S''$ is related to the electronic transition moment, $R_e(r)$ (in electric dipole moment atomic units), by

$$A_{v'v''} = (2.026 \times 10^{-6})\frac{(2 - \delta_{0,\Lambda'+\Lambda''})}{(2 - \delta_{0,\Lambda'})}\nu^3_{v'v''}\left[\int \psi^*_{v'} R_e(r)\psi_{v''}dr\right]^2, \tag{9}$$

where $\nu_{v'v''}$ is the band origin wavenumber (in cm^{-1}) and $\delta_{0,\Lambda}$ is the Kronecker delta, which equals 1 if $\Lambda = 0$ and equals 0 otherwise. For an electronic transition involving a change in spin, the corresponding relation is often more complicated, involving several independent transition moments (Whiting *et al.*, 1973). However, only one such spin-forbidden transition has been observed in air fluorescence, the N_2 $A\ ^3\Sigma^+_u$–$X\ ^1\Sigma^+_g$ Vegard-Kaplan band system. For this system the relation is simple; the fraction involving the Kronecker delta in equation (9) is just replaced by 2/3.

If the transition moment function, $R_e(r)$, for a band system is known from quantum-mechanical calculations, the Einstein coefficients for the bands can be calculated from equation (9). If, however, only experimental band strengths for some of the bands are known, equation (9) must first be inverted to solve for R_e in terms of the band strengths. The derived $R_e(r)$ can then be used to calculate the strengths or lifetimes of the other bands. The simplest method of performing this inversion is the r-centroid method (Fraser, 1954; Nicholls and Stewart, 1962). This method can be derived from a power series expansion of $R_e(r)$:

$$R_e(r) = a + br + cr^2 + \cdots. \tag{10}$$

The integral in equation (9) can then be written

$$\begin{aligned}\int \psi'_{v'} R_e(r) \psi_{v''} dr &= a \int \psi'_{v'} \psi_{v''} dr + b \int \psi'_{v'} r \psi_{v''} dr + c \int \psi'_{v'} r^2 \psi_{v''} dr + \cdots \\ &= q^{1/2}_{v'v''} \left[a + b\bar{r}_{v'v''} + c\bar{r}^2_{v'v''} Y^{(2)}_{v'v''} + \cdots \right], \end{aligned} \tag{11}$$

where

$$Y^{(2)}_{v'v''} = \frac{\int \psi'_{v'} r^2 \psi_{v''} dr / \int \psi'_{v'} \psi_{v''} dr}{\bar{r}^2_{v'v''}} = \frac{\overline{r^2_{v'v''}}}{\bar{r}^2_{v'v''}}. \tag{12}$$

For many band systems $R_e(r)$ can be well approximated by either a constant or a linear function of r, at least over the range of r important for the stronger bands. In this case the cr^2 term and higher terms in equation (10) can be dropped, and equation (11) becomes simply

$$\int \psi'_{v'} R_e(r) \psi_{v''} dr = q^{1/2}_{v'v''} R_e(\bar{r}_{v'v''}). \tag{13}$$

This is the r-centroid approximation.

Even when $R_e(r)$ is significantly nonlinear, equation (13) is a good approximation if the quantity $Y^{(2)}_{v'v''}$ in equations (11) and (12), and similar higher-order quantities, $Y^{(3)}_{v'v''} = \overline{r^3}/\bar{r}^3$, etc., are near unity. McCallum *et al.* (1972) have presented extensive tables of $Y^{(2)}_{v'v''}$ and $Y^{(3)}_{v'v''}$ for a number of N_2 band systems. For all except a small fraction of the bands, these quantities are within 10 percent of unity. Those bands having greater deviations from unity all have Franck-Condon factors less than 0.03, so they are relatively weak. However, there is a general tendency for the $Y^{(3)}_{v'v''}$ values to deviate more from unity than the $Y^{(2)}_{v'v''}$ values, so if still higher-order terms in the

power series representation of $R_e(r)$ are important the r-centroid approximation is likely to be less accurate.

A more direct method of determining the typical accuracy of the r-centroid approximation is to calculate both sides of equation (13) independently, for a number of bands and band systems, and compare the results. A small calculation of this type was made by Fraser (1954) for the N_2 B–A band system, assuming three different exponential-power-law variations in $R_e(r)$. However, he treated only $v' = 0$, $v'' = 0$–2, where the Franck-Condon factors are all greater than 0.16, so it is not surprising that he found that equation (13) was an excellent approximation.

In the course of the present work, we computed both sides of equation (13) for 15 band systems of N_2 and N_2^+ and 2 band systems of O_2^+, many with v', $v'' = 0$–21. Our results show that the r-centroid approximation is generally accurate for the stronger bands in a band system, which are usually the bands whose intensities can be most accurately measured experimentally. This justifies the standard r-centroid method of deducing $R_e(r)$ from band intensity measurements [e.g., Hartmann and Johnson (1978); Piper *et al.* (1989)]. Briefly, $R_e(r)$ is replaced by $R_e(\bar{r}_{v'v''})$ and equation (9) is rearranged to give

$$R_e(\bar{r}_{v'v''}) = \left[\frac{\text{const.} \times A_{v'v''}}{\nu^3_{v'v''} q_{v'v''}}\right]^{1/2}, \tag{14}$$

where the constant can be obtained from equation (9). Sometimes, absolute values of the Einstein coefficients, $A_{v'v''}$, can be obtained from band absorption measurements, utilizing the well-known relationship between absorption and emission coefficients, or from emission measurements, if the population of the emitting level can be determined by other means. More often, emission measurements give only relative values of $A_{v'v''}$ and, hence, of $R_e(\bar{r}_{v'v''})$. These relative values are placed on an absolute scale by a measurement of the radiative lifetime of one of the emitting levels. The resulting values then determine the function $R_e(\bar{r})$ with an accuracy that is usually limited only by the accuracy of the band intensity measurements and the number and range of the $\bar{r}_{v'v''}$ values covered, rather than by the accuracy of the r-centroid approximation. In the present work, this method of deriving transition moments has been utilized for a few band systems for which published results are either unavailable or have been superseded by better intensity measurements.

2.4 TREATMENT OF TRANSITIONS INVOLVING "PERTURBED" ELECTRONIC STATES.

Significant fluorescent radiation is known to be emitted by some high-lying states of N_2 that have irregularly-spaced vibrational levels due to strong perturbations by nearby states of the same type (Herzberg, 1950). Typical effects of such perturbations on the vibrational and rotational levels of several high N_2 states are illustrated in a paper by Carroll *et al.* (1970). These perturbations also cause irregularities in the intensities of the various bands, as shown, for example, by the recent extensive measurements of Ajello *et al.* (1989) on the N_2 c_4'–X and b'–X bands.

When two or more nearby electronic states of the same type interact strongly, it is possible to treat the resulting vibrational and rotational levels as mixtures of two or more "deperturbed" or "diabatic" electronic states. This has been done by Stahel *et al.* (1983) for three $^1\Sigma_u^+$ and three $^1\Pi_u$ states of N_2 lying in the 12–14 eV region. In such situations, the proportions of the mixture vary with the vibrational level, so the conventional Born-Oppenheimer separation of electronic and nuclear motion is no longer valid. Consequently, the concept of an electronic transition moment as a function of internuclear distance is no longer applicable. It is still possible, in principle, to calculate the intensities of the bands in a band system using a coupled-state approach, as used by Stahel *et al.* However, the computations become quite complex even when just two or three coupled states are involved. The perturbed N_2 states of present interest lie in an energy region where, as one goes to higher vibrational levels, more and more coupled states must be included in the calculation.

In the present situation, the most practical method for deriving the Einstein coefficients of bands involving perturbed states is to use measured relative emission intensities, normalized by radiative lifetime measurements or absolute absorption measurements. This method has been applied here to the N_2 b–X, c_4'–X, and c_4'–a band systems. It should be noted, however, that the strength of a perturbation can change with the rotational level in a given vibrational level. Hence, the Einstein coefficients of the individual rotational lines in a perturbed band may differ. Consequently, the mean Einstein coefficient for a perturbed band may vary with temperature, since changing the temperature changes the relative contributions of the different rotational lines in a band.

SECTION 3

RESULTS FOR ELECTRONIC TRANSITION MOMENTS

Electronic transition moment functions for many of the N_2, N_2^+, and O_2^+ band systems considered in this report have been published or may be derived from published data using the method described in Section 2.3. Some of these band systems have been studied extensively, while for others little information is available. In the present work, an effort has been made to identify the most accurate electronic transition moments from the choices available; usually this involved selecting the most recent work. The recent advances in the quantum-mechanical calculation of diatomic dipole moments are demonstrated by the selection of such theoretical values as the best available values for eleven of the band systems treated, while values derived by the r-centroid method were selected for only four systems.

The best available $R_e(r)$ data for most of the band systems treated are plotted in Figures 1 through 13. Some of these figures also include, for comparison, other data not used in the subsequent calculations because they are known to be or appear to be less accurate than the data used. No figures are presented for two band systems for which similar figures in the original references are adequate, or for two band systems where no information on the variation of R_e with r is available.

As a convenience in making subsequent calculations of Einstein coefficients, we have derived mathematical fits to the preferred transition moments, of the form

$$R_e(r) = a + br + cr^2 + d\exp[-f(r-g)^2], \tag{15}$$

where a, ..., g are constant coefficients, $R_e(r)$ is in electric dipole moment atomic units, and r is in Å. These units are consistent with equation (9) for computing Einstein coefficients in units of s^{-1}. Our fits are indicated and plotted in Figures 1–13, and their coefficients are also listed in Table 1. The dipole moment functions for over half of the band systems treated could be satisfactorily fit with just a Gaussian term, i.e., the last term in equation (15). This expression has the advantage that it remains bounded everywhere and approaches zero for large values of r, which is known theoretically to be the correct behavior for most of the transitions considered. The dipole moment functions of the remaining band systems were fit with constant, linear, or quadratic expressions, corresponding to the first three terms on the right-hand side of equation (15), except for the O_2^+ A–X system, where a constant plus

a Gaussian term was found necessary to obtain a good fit. Generally, in the ranges of r of practical interest, all of the fits appear to be essentially as accurate as the basic data that they fit.

Figures 1–13 and Table 1 are generally self-explanatory, except for one N_2^+ and two O_2^+ band systems. For the N_2^+ A–X band system, Figure 9 shows two fairly recent quantum-mechanical results, and one semi-empirical curve deduced by Gattinger and Vallance Jones (1981) from measured relative band intensities, using the r-centroid method. The two theoretical $R_e(r)$ functions have similar shapes and agree within 10 percent. Probably the more recent one, from Langhoff *et al.* (1987), is more accurate. The semi-empirical curve was derived only over a limited range of r, and has a different shape, which gives unreasonable values of $R_e(r)$ if extrapolated very far. Gattinger and Vallance Jones' Figure 4 shows that this curve fits their data points quite well. However, when their data are corrected for the improved Franck-Condon factors calculated in the present work, and additional points are added from their tables and references, the data become more scattered, and do not fit their curve as well as they do the theoretical curves.

For the O_2^+ A–X and b–a band systems, the recent quantum-mechanical results of Blomberg and Liu (1988) for both systems, and of Langhoff *et al.* (1989) for the latter system, appear to be quite accurate. This conclusion is supported by the excellent agreement between the two calculations for the b–a system, as shown in Figure 13. Blomberg and Liu's results for the A–X system also agree reasonably well with the results of the somewhat more-approximate calculations of Wetmore *et al.* (1984) (see Figure 12). Accordingly, the most recent theoretical results have been fit as shown in Figures 12–13 and Table 1, for use in our subsequent calculations.

A semi-empirical A–X curve deduced by Erman and Larsson (1977) from their measured lifetimes for $A(v = 0\text{–}7)$ is also included in Figure 12. This curve differs significantly from the two theoretical curves, particularly at large internuclear separations, where the theoretical curves approach a linear variation, as expected theoretically for this transition. Moreover, using Erman and Larsson's curve, we calculated A-state lifetimes about 20 percent shorter than they measured. Erman and Larsson also presented a transition moment curve for the b–a system, based on their measured lifetimes for $b(v = 0\text{–}7)$. This curve has not been included in our Figure 13 because later measurements by Moseley *et al.* (1979) show that the

higher levels, $b(v > 3)$, have very short lifetimes due to predissociation, and all emissions observed by Erman and Larsson originated from $b(v = 0\text{–}3)$. This correction, combined with Erman and Larsson's listing of b-state lifetimes that increase by 22 percent from $v = 3$ to "$v = 7$," also indicates that their accuracy estimate of about ± 7 percent is overly optimistic.

In addition, we made an attempt to apply the r-centroid method to the recent relative intensity measurements on the O_2^+ A–X bands by Schappe *et al.* (1988). However, the relative $R_e(r)$ values derived from their published intensities were widely scattered. Further study suggested that they probably had a bigger problem with overlapping bands than they assumed. For example, the (0-6) and (4-8) bands are nearly coincident, and so are the (0-7) and (6-10) bands, but Schappe *et al.* attributed the measured intensities entirely to the first band of each pair.

SECTION 4
BAND-ARRAY RESULTS

In this section, tables of calculated radiative transition parameters are presented for the 38 band systems considered in this report. Tables 2 through 18 give a complete set of radiative transition parameters for 17 N_2, N_2^+, and O_2^+ band systems that are important in emission. With the exception of Tables 6, 11, and 12, these tables include seven quantities for each v'–v'' band; they are (as ordered in the tables):

1. Band origin wavelength, $\lambda_{v'v''}$ (μm);

2. Band origin wavenumber, $\nu_{v'v''}$ (cm^{-1});

3. Franck-Condon factor, $q_{v'v''}$;

4. R-centroid, $\bar{r}_{v'v''}$ (Å);

5. Electronic transition moment, $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units);

6. Einstein coefficient, $A_{v'v''}$ (s^{-1}), calculated by the r-centroid method;

7. Einstein coefficient, $A_{v'v''}$ (s^{-1}), calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

The last two items are Einstein coefficients calculated by the r-centroid approximation and by direct integration. Since the latter is the more accurate of the two values, it is placed at the end of the list so that it can be read from the tables more easily.

In Tables 6, 11, and 12, item #6 has been omitted. This is because these three band systems have constant $R_e(r)$ functions, and, as shown in Section 2, the r-centroid approximation is exact for $R_e(r)$ functions that are constant or vary linearly with internuclear distance. Thus, the two different methods of calculating Einstein coefficients yield the same result for these cases, as we have verified numerically for many bands in these three systems, as well as for a test case involving a linear variation.

For more than half of the band systems in Tables 2–18, radiative transition parameters are presented for v', $v'' = 0$–21. The exceptions include the band systems that involve the N_2 $w\ ^1\Delta_u$, $C\ ^3\Pi_u$, $E\ ^3\Sigma_g^+$, and $D\ ^3\Sigma_u^+$ states, for which the available spectroscopic data are insufficient to permit reliable extrapolation to $v = 21$ (see Laher and Gilmore, 1991). In addition, results for the N_2^+ $B^2\Sigma_u^+$–$X^2\Sigma_g^+$ system are limited to $v' = 0$–10, since the unusual behavior of the energy levels and potential curve of the B state prevent an adequate fit by the usual spectroscopic power series beyond $v = 8$ or 10 (Laher and Gilmore, 1991). It would be possible to extend the present B–X calculations to higher vibrational levels by using a numerical RKR method, but since these levels are not significant in air fluorescence, this was not done.

For some of the bands in Tables 2–18, the wavelengths, wavenumbers, and Einstein coefficients have negative signs in front of their numerical values. This is to indicate that the transition is reversed. The N_2 B–A (0-8) band at 8.85 μm in Table 3 is an example. Since the A ($v'' = 8$) state is higher in energy than the B ($v' = 0$) state, the transition proceeds from the A state to the B state. Such cases are known as reverse bands.

The calculated strengths of bands with small Franck-Condon factors are often less accurate than those with larger Franck-Condon factors. Accordingly, in Tables 2–18, the Einstein coefficients calculated by direct integration are marked with asterisks if the corresponding Franck-Condon factors are less than 0.01. There are two situations in which small Franck-Condon factors arise. The first is when the wavefunctions of the upper and lower states overlap very little; in this case, the calculated band strength is usually quite accurate. The second is when the wavefunctions do overlap but, because of a near cancellation between similar contributions of positive and negative values of $\psi_v^* \cdot \psi_{v''}$, the resulting overlap integral is small. In this case, the overlap integral is sensitive to small variations in the potential energy curves, especially for high vibrational levels, and the resulting Franck-Condon factor may not be very accurate.

It is also interesting to note for which bands in the tables the Einstein coefficients calculated by the two methods disagree significantly. Accordingly, when the two values differ by more than 10%, the r-centroid value in the tables has been

enclosed in parentheses. Such disagreement tends to occur when $R_e(r)$ is significantly nonlinear and the Franck-Condon factor is small.

The radiative lifetimes of 14 N_2, N_2^+, and O_2^+ states have also been calculated and are presented in Table 19 as a function of vibrational level. These quantities were obtained by taking the inverse of the sum of the Einstein coefficients (calculated by direct integration) for transitions from a given upper level to all possible lower levels, which may include more than one electronic state. For example, the radiative lifetime for a given v' of the N_2 A state was found by summing over v'' all $A_{v'v''}$ values for the A-X and B–A-reverse band systems. The calculated lifetimes are generally in good agreement with the best available measurements, which can be verified by consulting the references given in Table 1. It should be noted, however, that radiative lifetimes for most of the levels listed in Table 19 have never been measured.

Tables 20 through 35 present tables of Franck-Condon factors for transitions between the upper states covered in the previous tables and the ground state, except for the N_2 A-X and a–X band systems, where Franck-Condon factors have already been presented in Tables 2 and 6. Eight of these tables cover N_2 band systems for which insufficient information is available to calculate accurate Einstein coefficients, generally because they are very weak ("forbidden") transitions. In addition, eight nitrogen and oxygen ionization systems are included for application to photoionization and electron-impact ionization problems. The Franck-Condon factors presented in these tables are generally more accurate than those in previously published work because the RKR potential energy curves used in the present calculations are based on spectroscopic constants that are valid to higher vibrational levels.

Tables 36 through 38 cover three N_2 band systems with perturbed upper states. As discussed in Section 2.4, perturbations involve mixing between electronic states, so the relations derived earlier for Franck-Condon factors, Einstein coefficients, etc., are no longer applicable. Consequently, Tables 36–38 simply list band origin or band head wavelengths derived from spectroscopic measurements, and Einstein coefficients derived from measurements of absolute absorption band intensities, relative emission band intensities and upper-state lifetimes. The sources and limitations of the basic data are indicated on the tables.

SECTION 5

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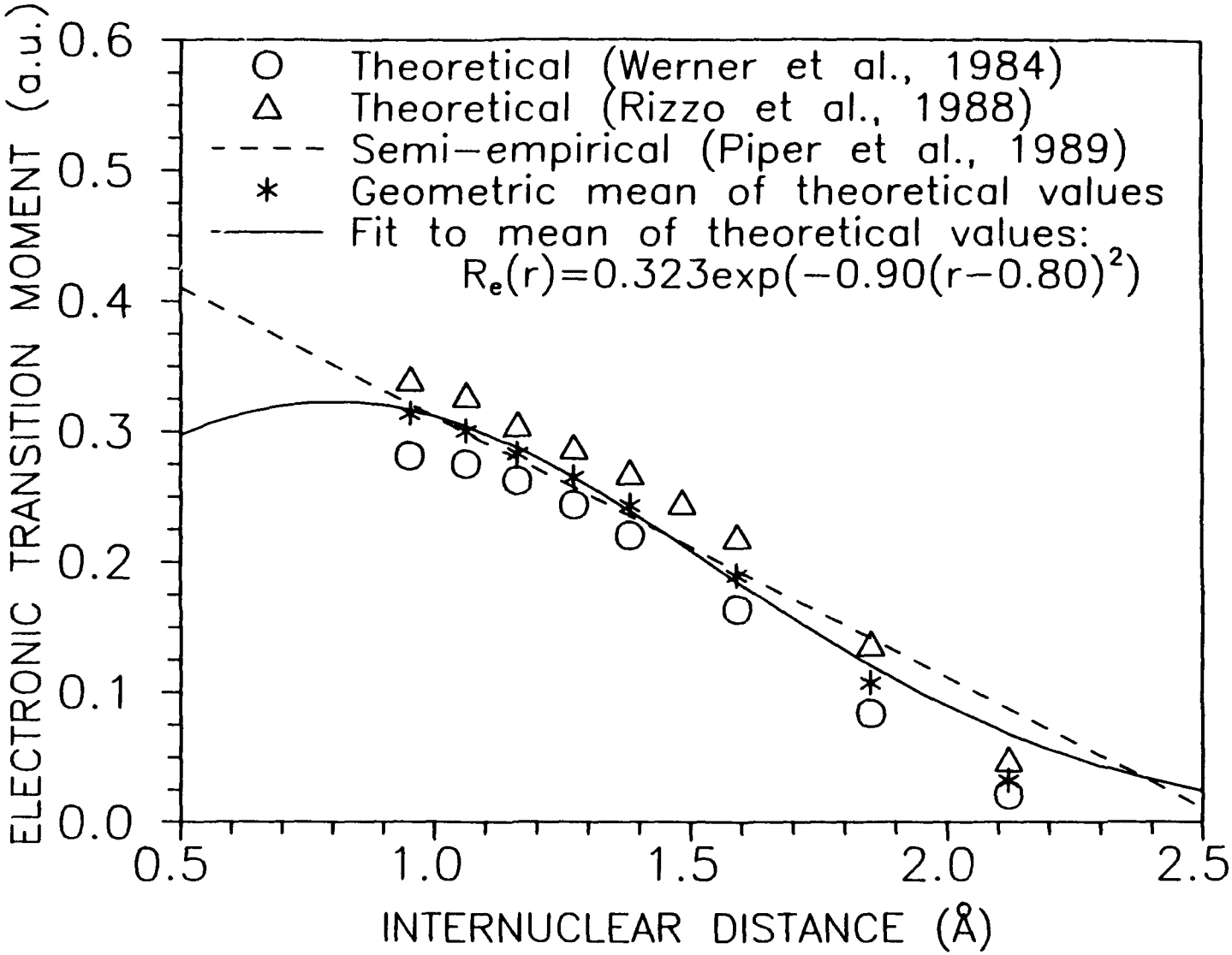

Figure 1. Electronic transition moment data and fit for the N_2 $B\ ^3\Pi_g$–$A\ ^3\Sigma_u^+$ band system.

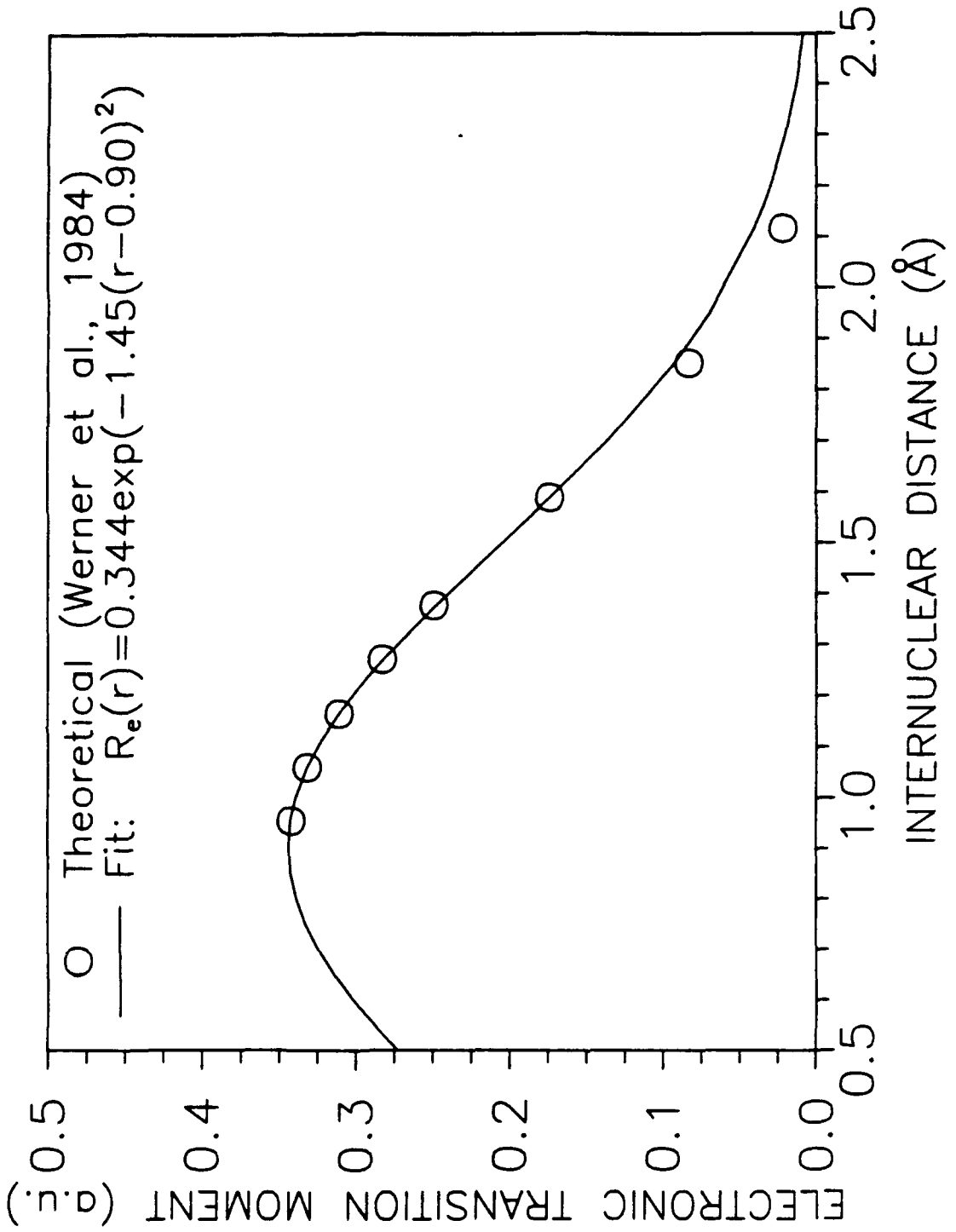

Figure 2. Electronic transition moment data and fit for the N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$ band system.

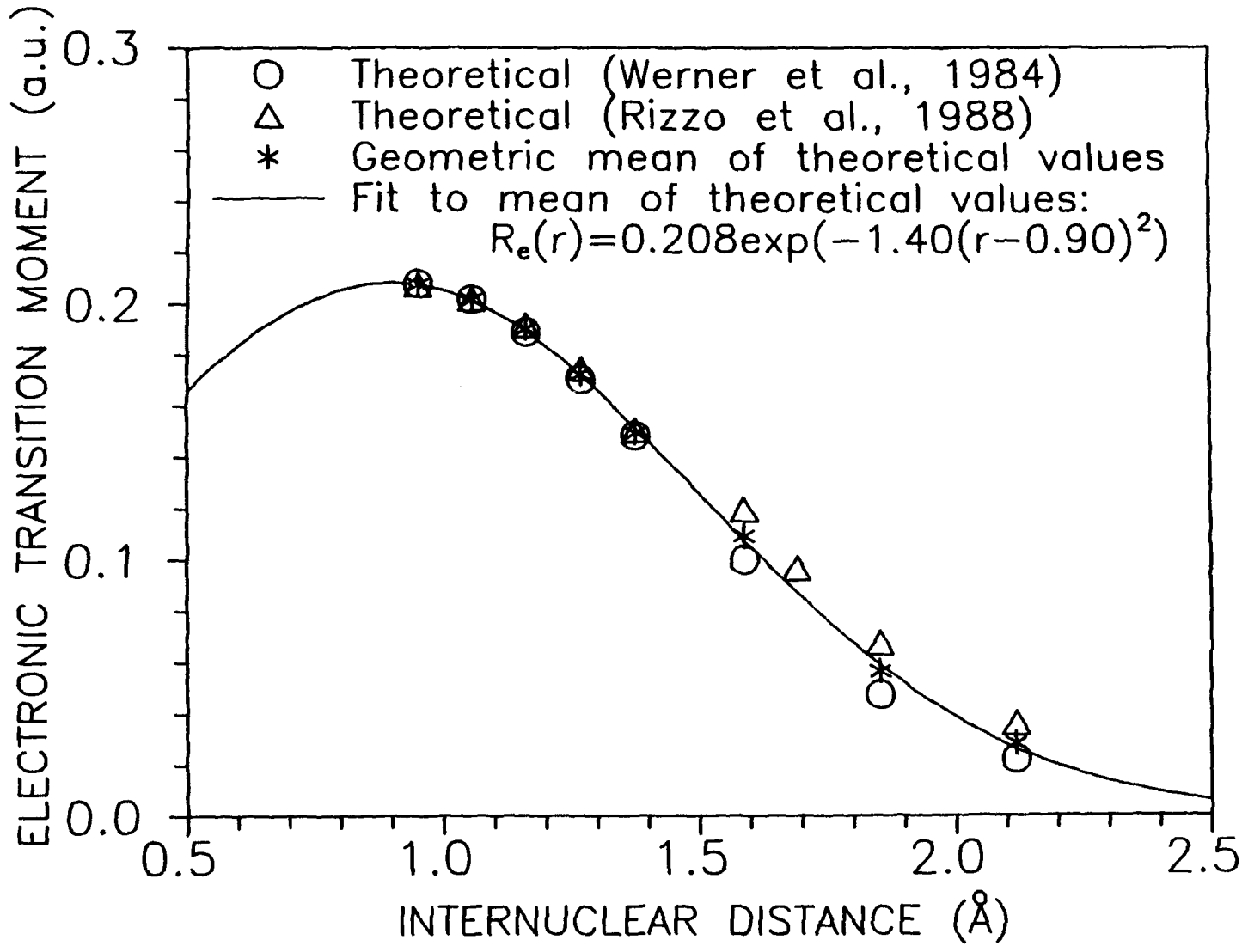

Figure 3. Electronic transition moment data and fit for the N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$ band system.

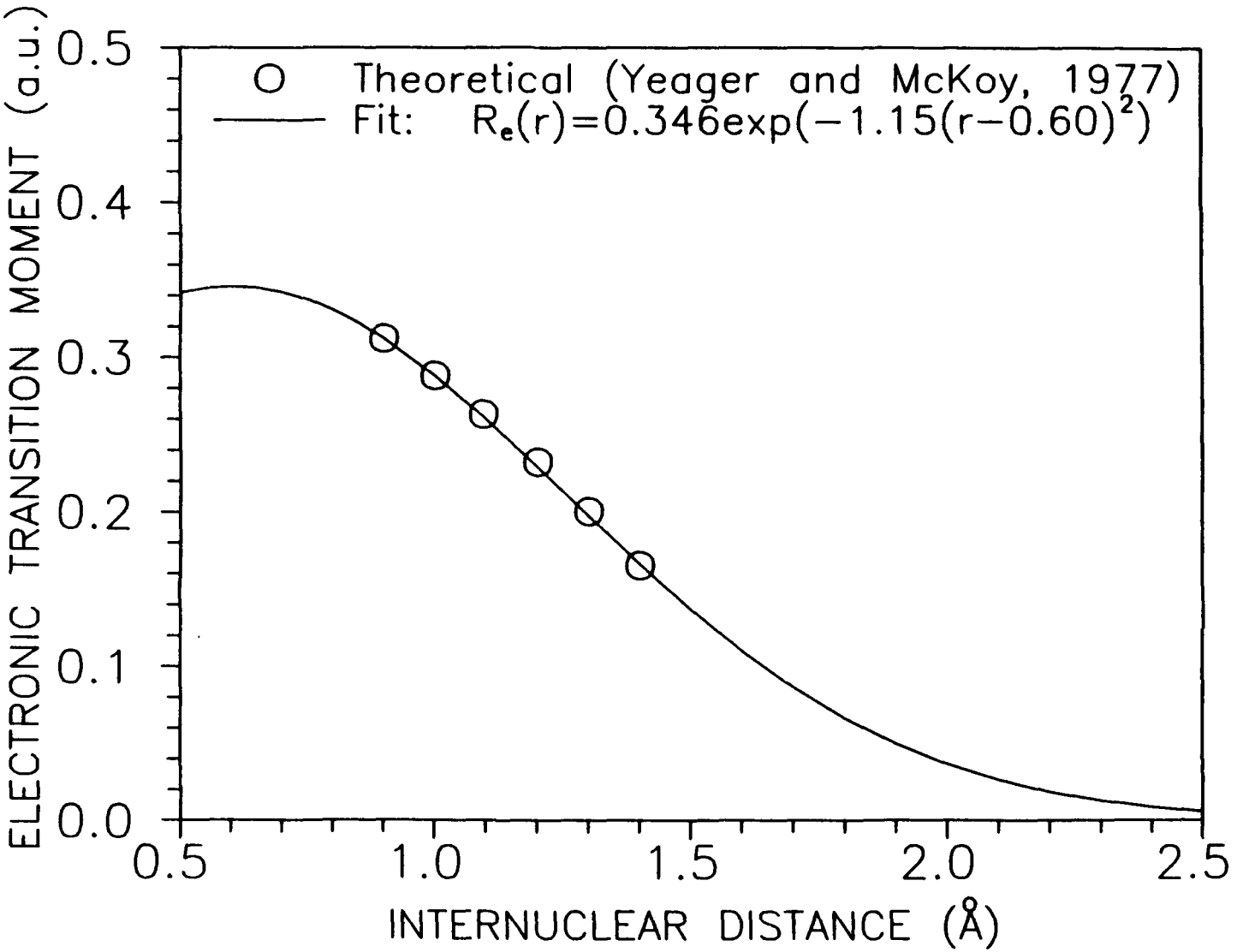

Figure 4. Electronic transition moment data and fit for the N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$ band system.

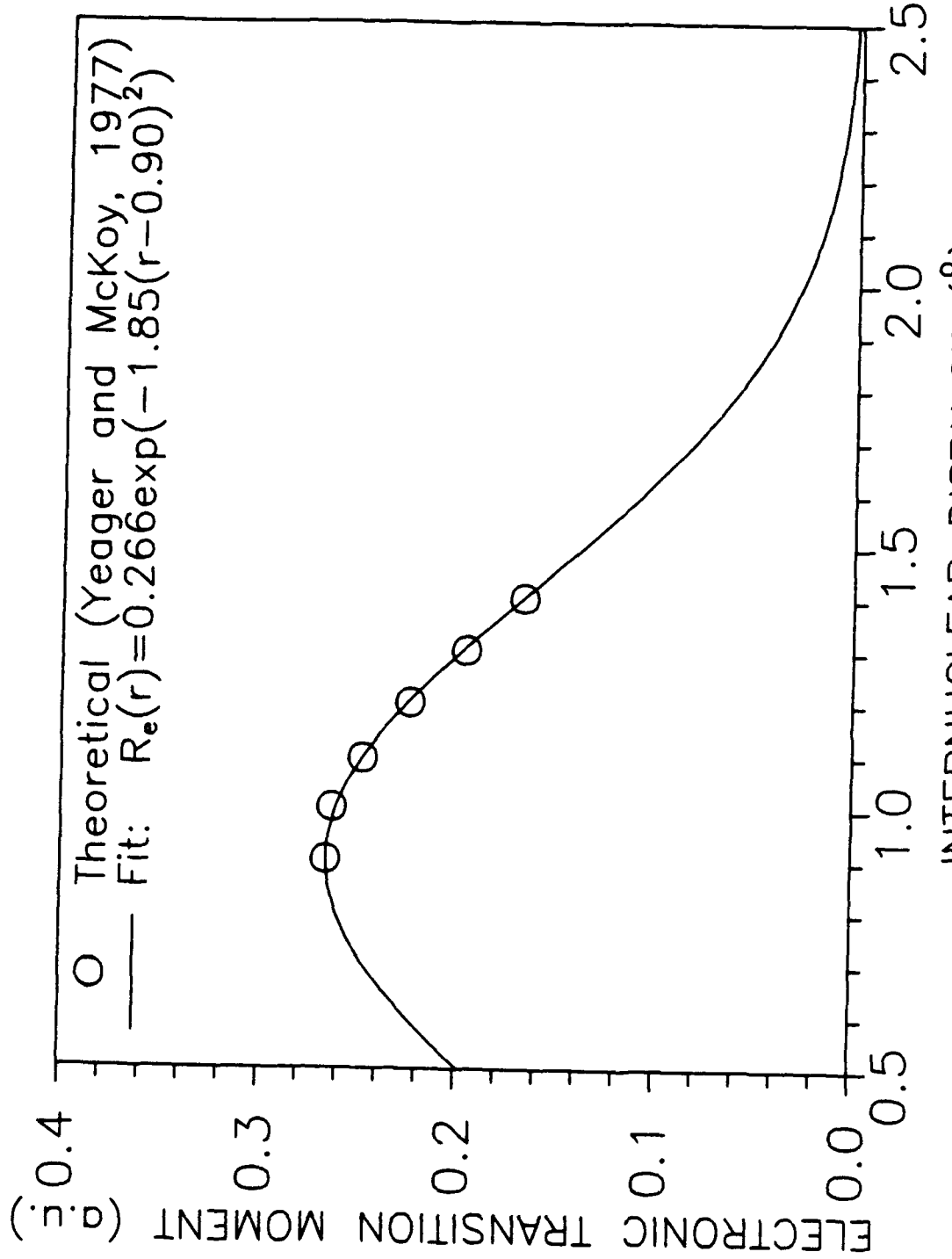

Figure 5. Electronic transition moment data and fit for the N_2 $w\ ^1\Delta_u$–$a\ ^1\Pi_g$ band system.

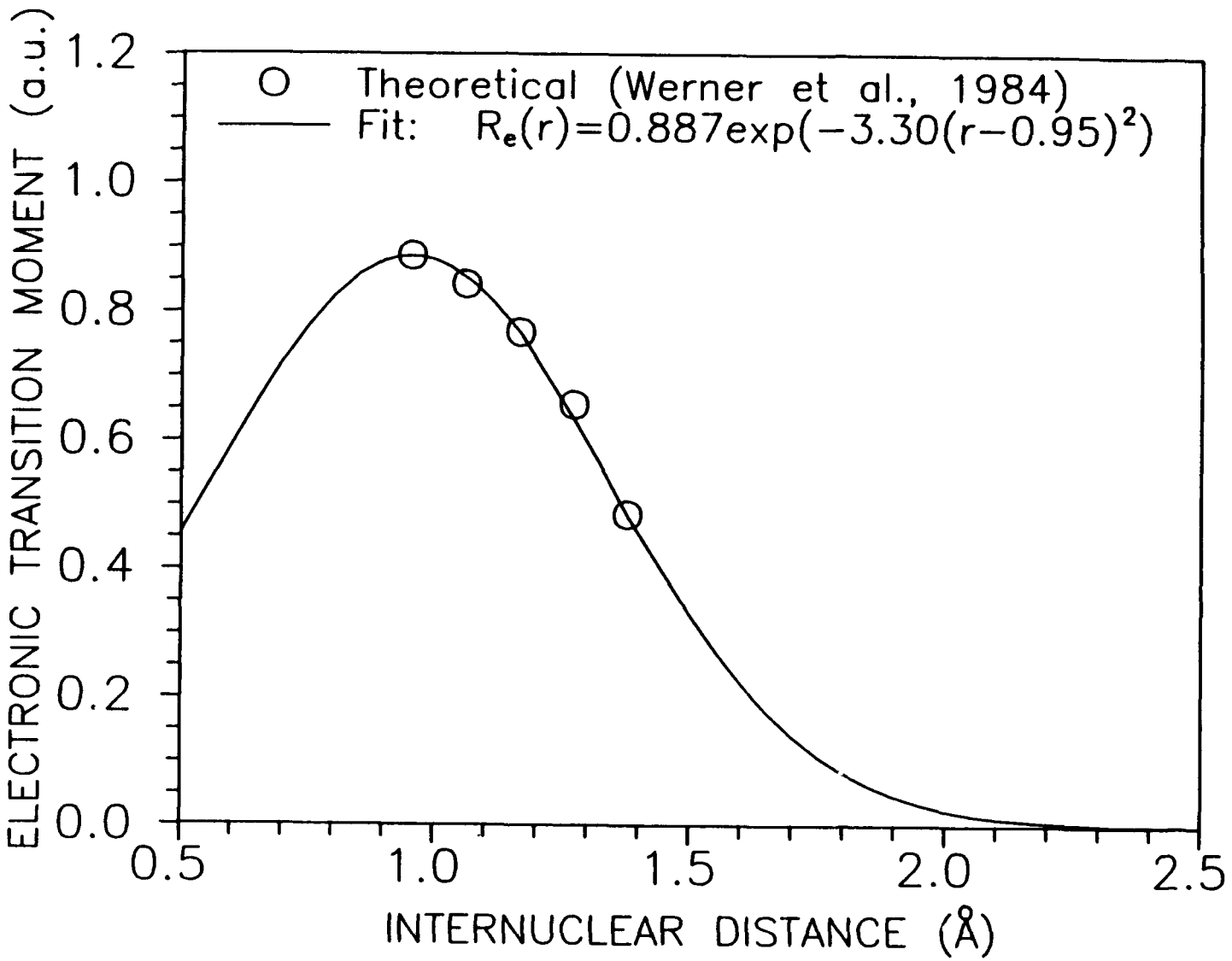

Figure 6. Electronic transition moment data and fit for the N_2 $C\ ^3\Pi_u$–$B\ ^3\Pi_g$ band system.

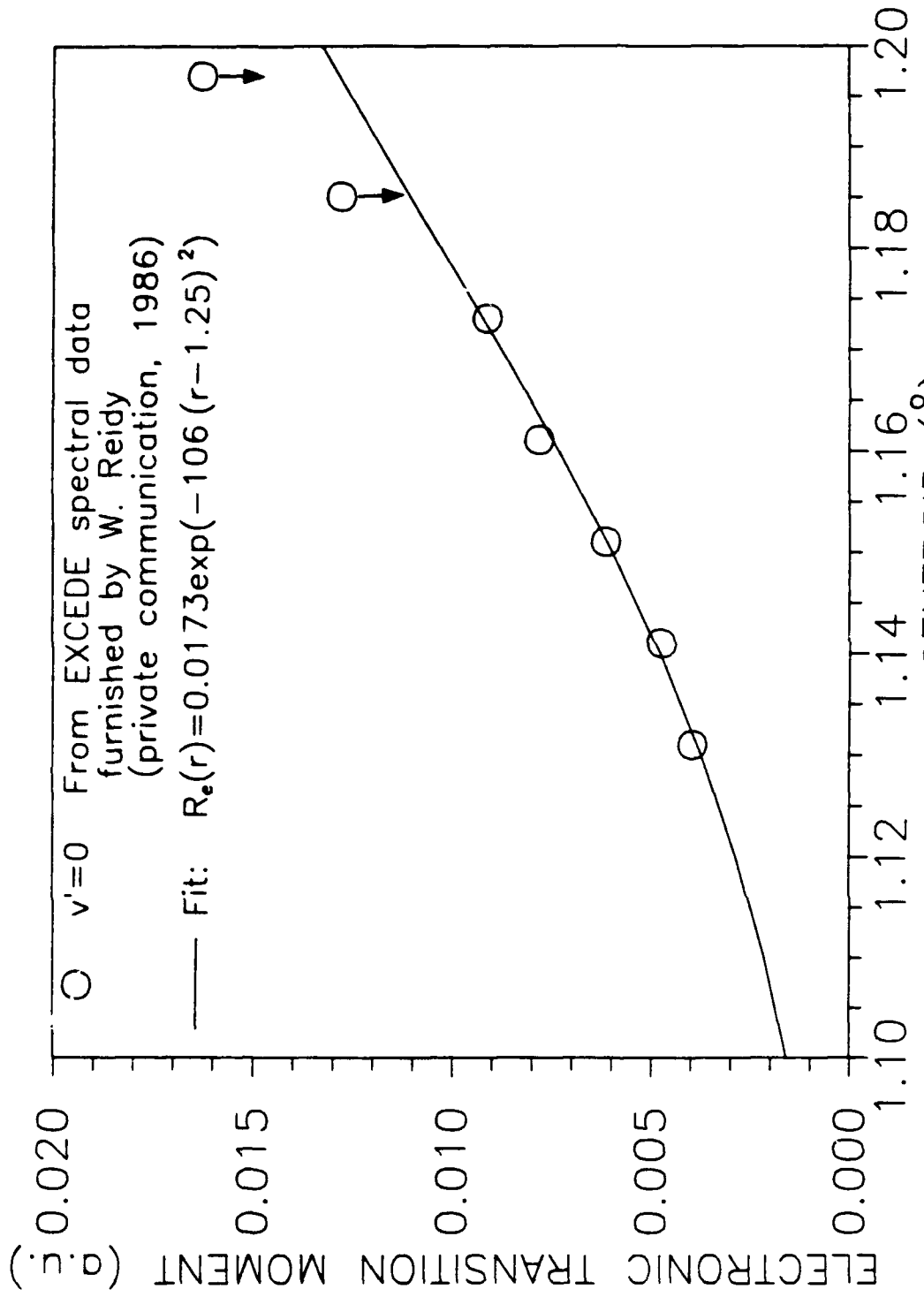

Figure 7. Electronic transition moment data and fit for the N_2 $E\,^3\Sigma_g^+ - A\,^3\Sigma_u^+$ band system.

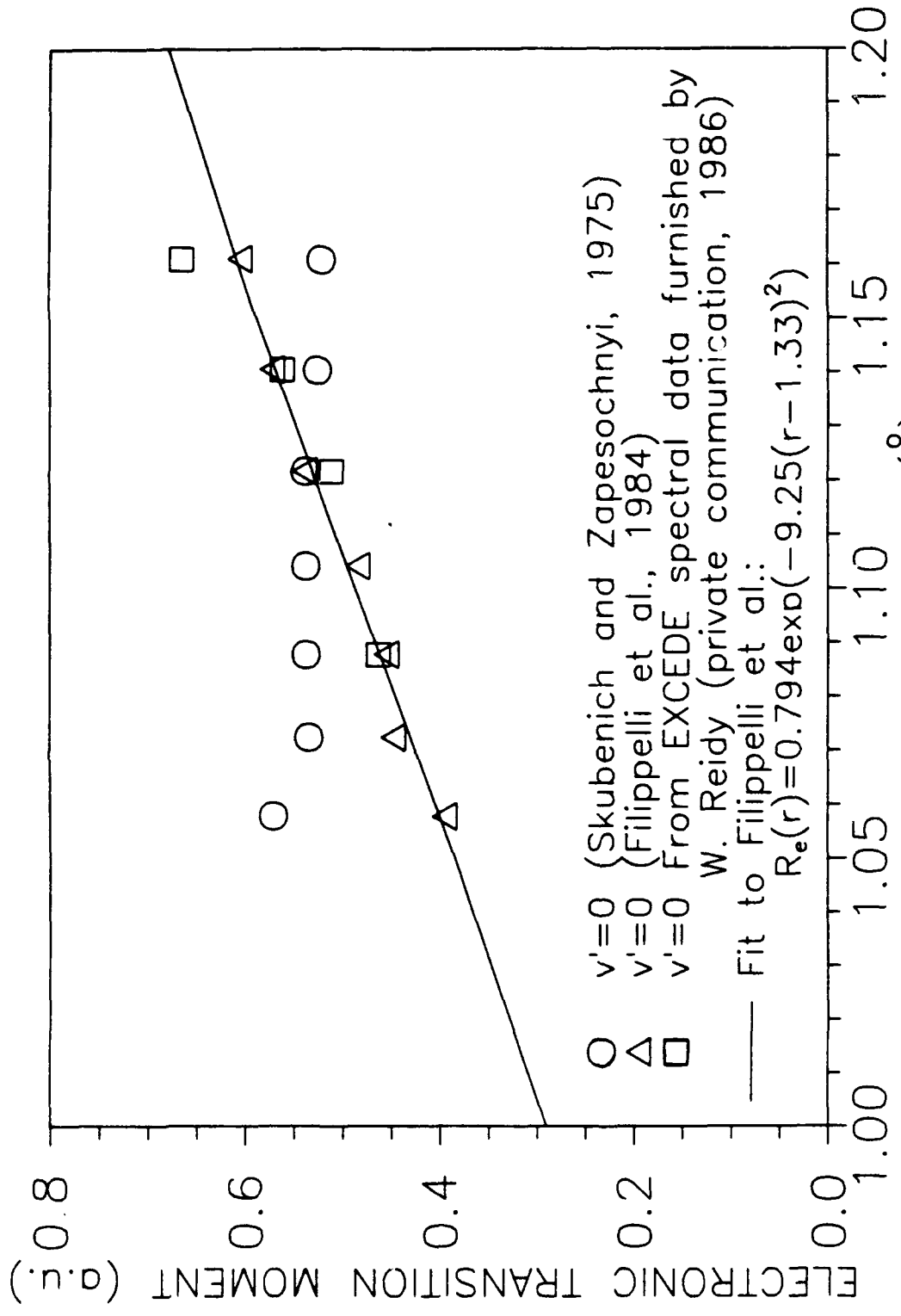

Figure 8. Electronic transition moment data and fit for the N_2 $D\,^3\Sigma_u^+ - B\,^3\Pi_g$ band system.

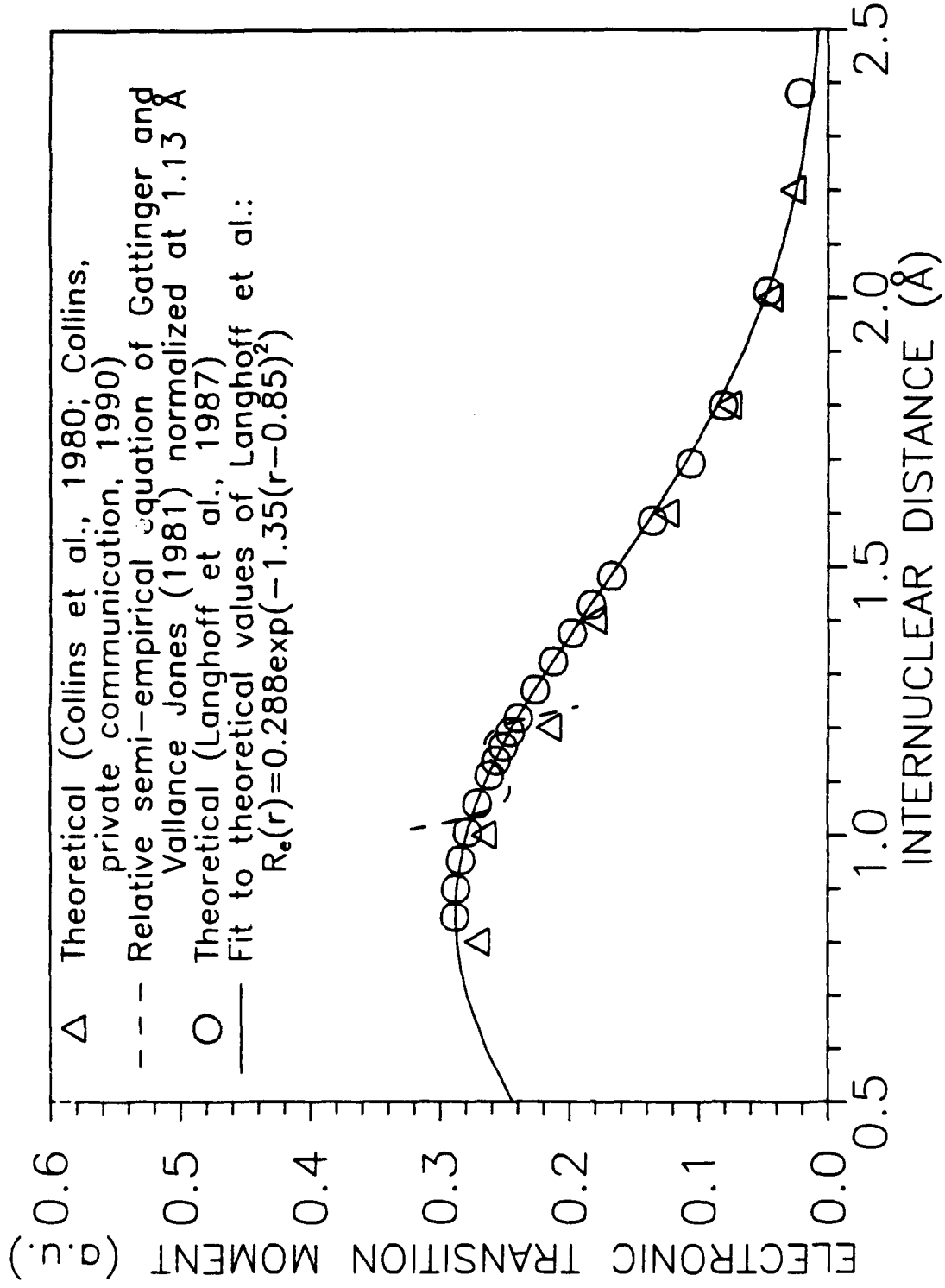

Figure 9. Electronic transition moment data and fit for the N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$ band system.

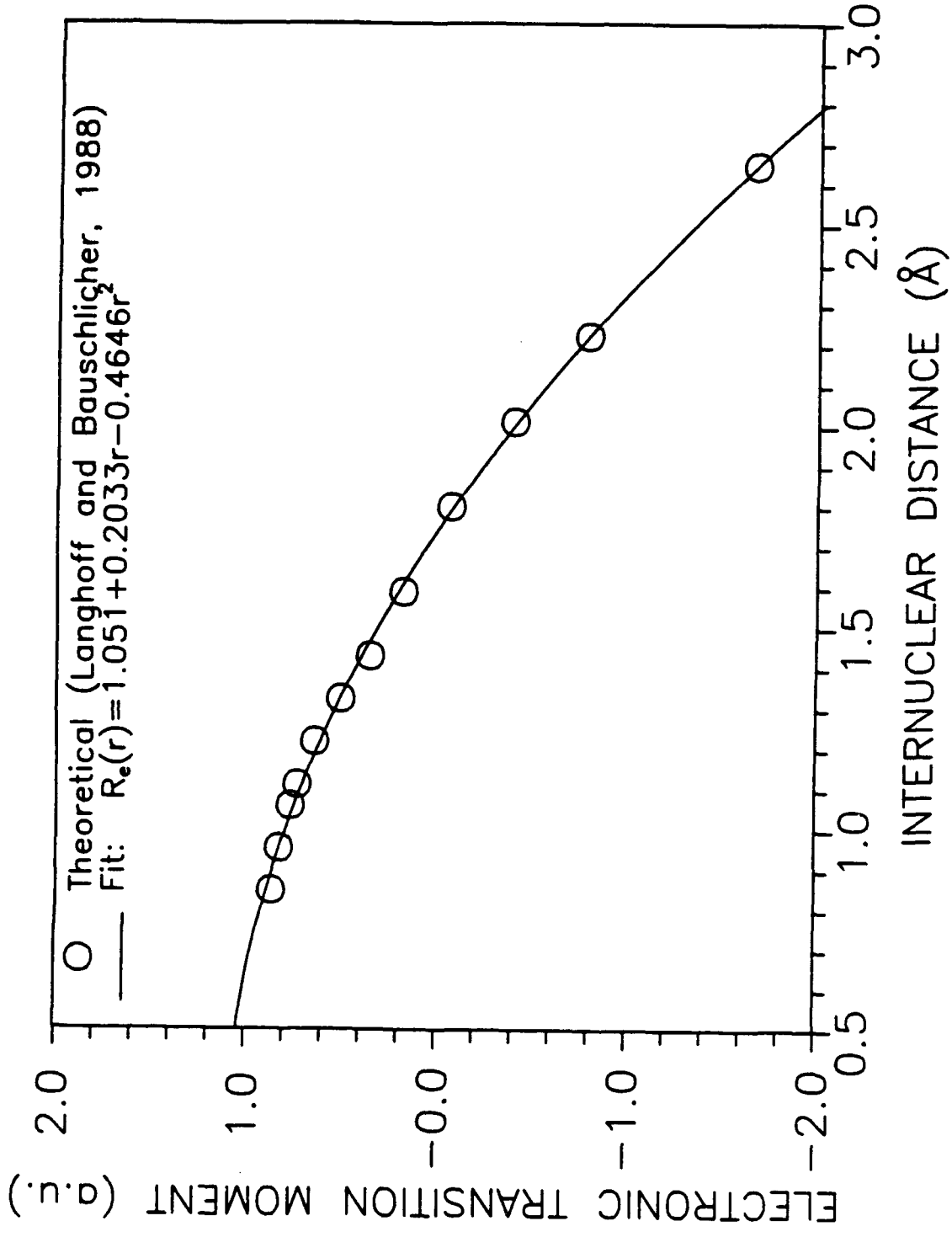

Figure 10. Electronic transition moment data and fit for the N_2^+ $B\ ^2\Sigma_u^+$–$X\ ^2\Sigma_g^+$ band system.

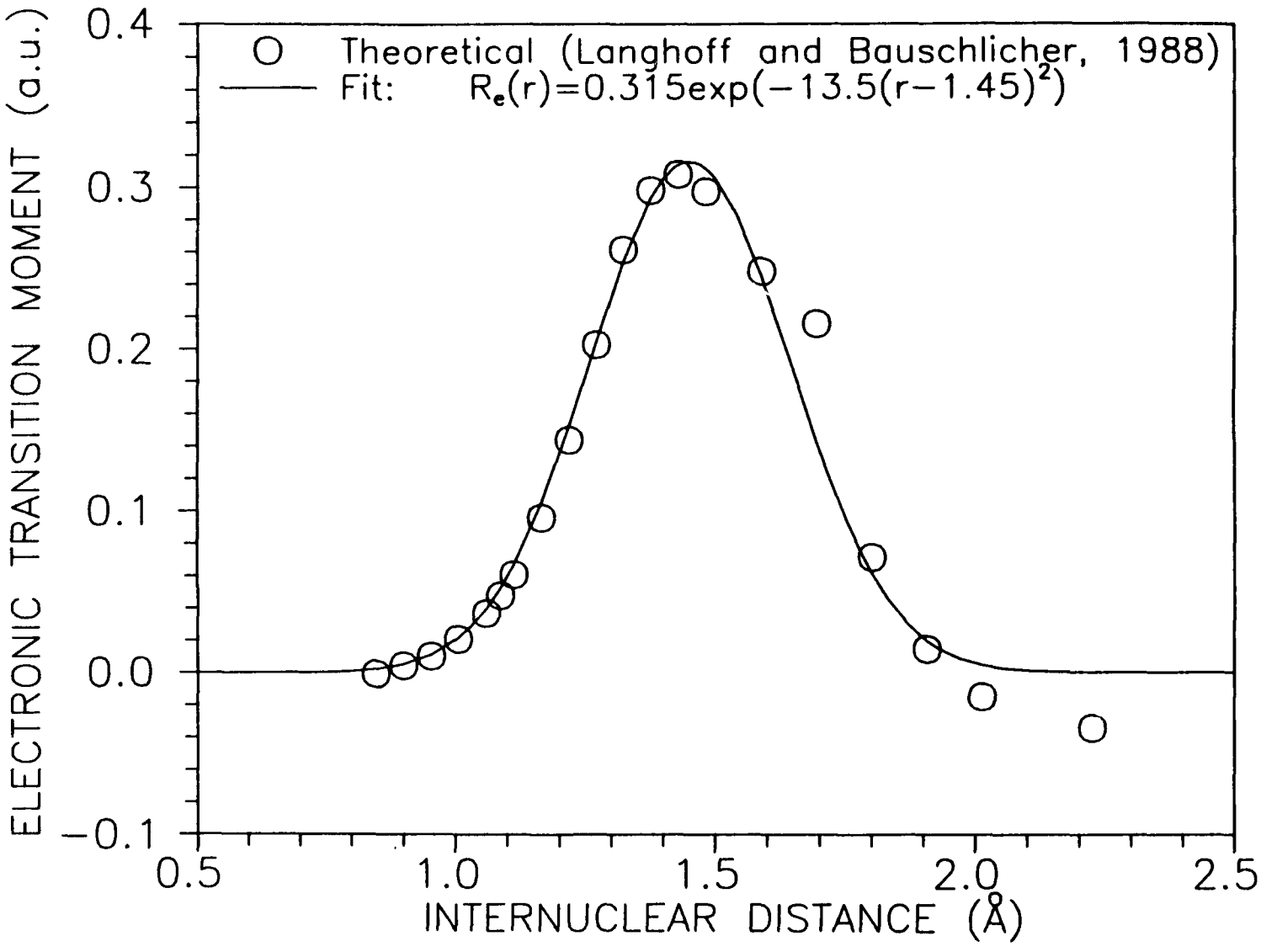

Figure 11. Electronic transition moment data and fit for the N_2^+ $C\ ^2\Sigma_u^+$–$X\ ^2\Sigma_g^+$ band system.

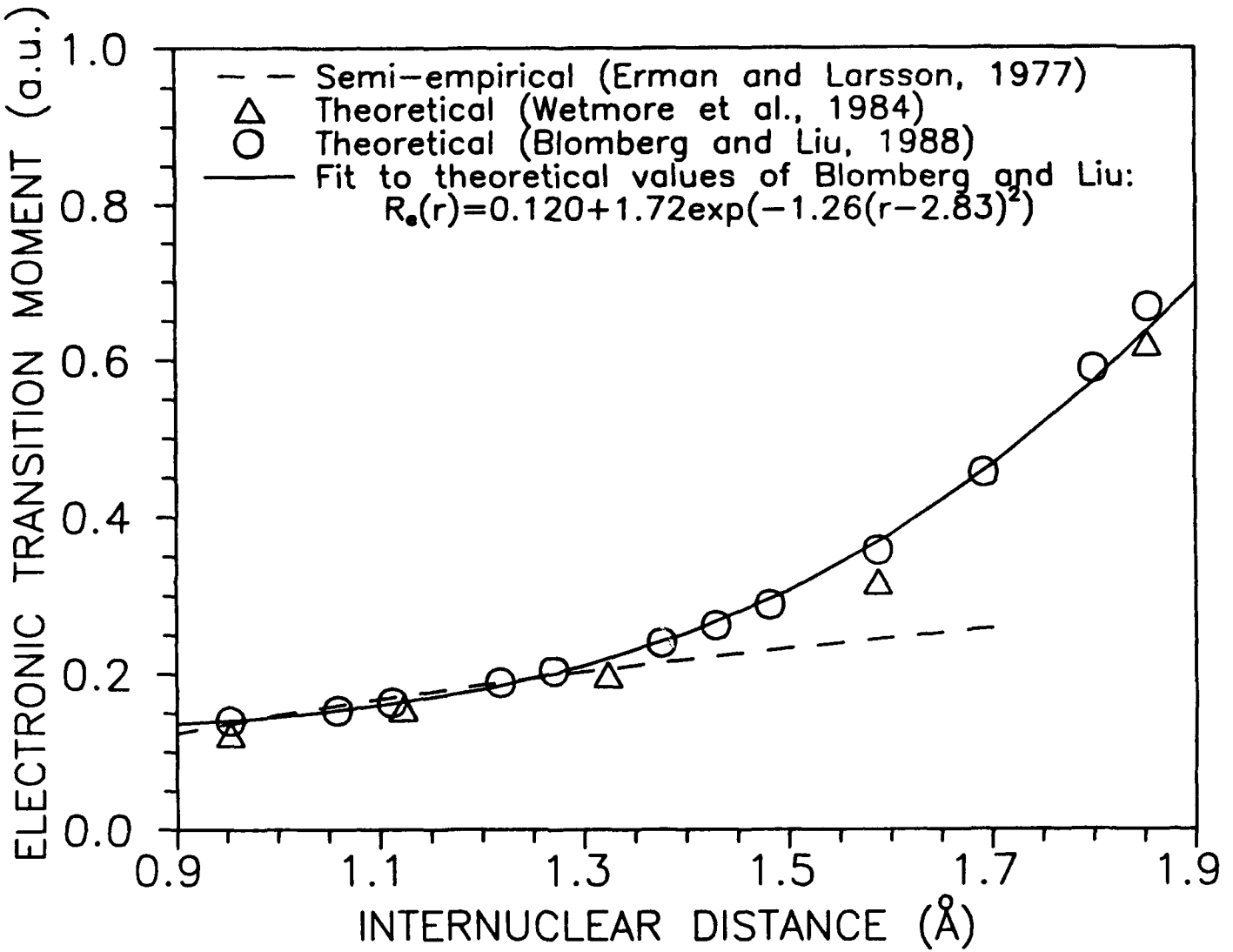

Figure 12. Electronic transition moment data and fit for the O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$ band system.

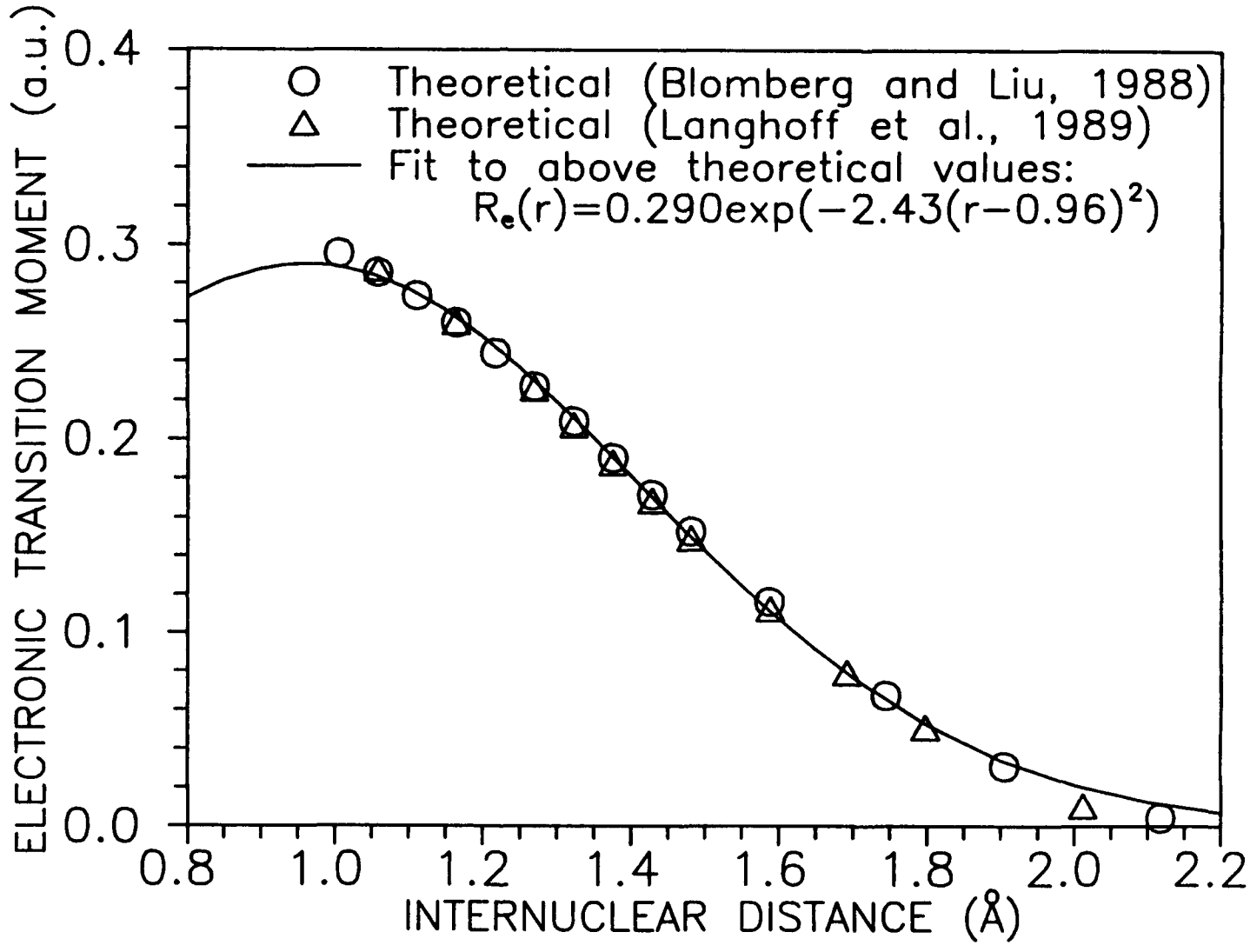

Figure 13. Electronic transition moment data and fit for the O_2^+ $b\ ^4\Sigma_g^-$–$a\ ^4\Pi_u$ band system.

Table 1. Coefficients of analytic fits to the electronic transition moments of N_2, N_2^+, and O_2^+ band systems.

$R_e(r) = a + br + cr^2 + d\exp[-f(r-g)^2]$ (R_e is in electric dipole moment atomic units; r is in Å.)

Band system		a	b	c	d	f	g	References
N_2	$A\ ^3\Sigma_u^+$-$X\ ^1\Sigma_g^+$	0.00119	-0.00117	0.000139				Shemansky (1969a), renormalized to give mean Einstein coefficients, averaged over substates.
	$B\ ^3\Pi_g$-$A\ ^3\Sigma_u^+$				0.323	0.90	0.80	Fit to geometric mean of theoretical values of Werner *et al.* (1984) and Rizzo *et al.* (1988) (see Fig. 1).
	$W\ ^3\Delta_u$-$B\ ^3\Pi_g$				0.344	1.45	0.90	Fit to theoretical values of Werner *et al.* (1984) (see Fig. 2).
	$B'\ ^3\Sigma_u^-$-$B\ ^3\Pi_g$				0.208	1.40	0.90	Fit to geometric mean of theoretical values of Werner *et al.* (1984) and Rizzo *et al.* (1988) (see Fig. 3).
	$a\ ^1\Pi_g$-$X\ ^1\Sigma_g^+$	0.00588						R_e=constant from Shemansky (1969b), renormalized to give a $v = 0$ lifetime of 58 μs (Marinelli *et al.*, 1989). This includes a little contribution from electric quadrupole radiation; see Dahl and Oddershedde (1986).
	$a\ ^1\Pi_g$-$a'\ ^1\Sigma_u^-$				0.346	1.15	0.60	Fit to theoretical values of Yeager and McKoy (1977) (see Fig. 4).
	$w\ ^1\Delta_u$-$a\ ^1\Pi_g$				0.266	1.85	0.90	Fit to theoretical values of Yeager and McKoy (1977) (see Fig. 5).
	$C\ ^3\Pi_u$-$B\ ^3\Pi_g$				0.887	3.30	0.95	Fit to theoretical values of Werner *et al.* (1984) (see Fig. 6).

Table 1. Coefficients of analytic fits to the electronic transition moments of N_2, N_2^+, and O_2^+ band systems. – Continued

$R_e(r) = a + br + cr^2 + d\exp[-f(r-g)^2]$ (R_e is in electric dipole moment atomic units; r is in Å.)

Band system		a	b	c	d	f	g	References
N_2	$E\ ^3\Sigma_g^+$–$A\ ^3\Sigma_u^+$				0.0173	106	1.25	Fit to relative $R_e(\bar{r})$ values derived from spectral measurements on the EXCEDE rocket-lofted electron-gun experiment (furnished by W. Reidy, private communication, 1986) (see Fig. 7); R_e=constant is assumed for the E–B and E–C transitions. Absolute normalization from E-state lifetime of 190 μs (Borst and Zipf, 1971) and relative radiation rates of the three band systems (Freund, 1969).
	$E\ ^3\Sigma_g^+$–$B\ ^3\Pi_g$	0.00185						
	$E\ ^3\Sigma_g^+$–$C\ ^3\Pi_u$	0.0414						
	$D\ ^3\Sigma_u^+$–$B\ ^3\Pi_g$				0.794	9.25	1.33	Fit to relative $R_e(\bar{r})$ values derived from emission data of Filippelli *et al.* (1984) (see Fig. 8); normalized to give a $v = 0$ lifetime of 14.1 ns (Kurzweg *et al.*, 1973).
N_2^+	$A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$				0.288	1.35	0.85	Fit to theoretical values of Langhoff *et al.* (1987) (see Fig. 9).
	$B\ ^2\Sigma_u^+$–$X\ ^2\Sigma_g^+$	1.051	0.2033	-0.4646				Fit to theoretical values of Langhoff and Bauschlicher (1988) (see Fig. 10). Calculation using this fit yields a $v = 0$ lifetime of 62.3 ns, which is within 2% of the measurement of Schmoranzer *et al.* (1989) (see Table 19).
	$C\ ^2\Sigma_u^+$–$X\ ^2\Sigma_g^+$				0.315	13.5	1.45	Fit to theoretical values of Langhoff and Bauschlicher (1988) (see Fig. 11).
O_2^+	$A\ ^2\Pi_u$–$X\ ^2\Pi_g$	0.120			1.72	1.26	2.83	Fit to theoretical values of Blomberg and Liu (1988) (see Fig. 12).
	$b\ ^4\Sigma_g^-$–$a\ ^4\Pi_u$				0.290	2.43	0.96	Fit to theoretical values of Blomberg and Liu (1988) and Langhoff *et al.* (1989) (see Fig. 13).

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.2010	.2109	.2216	.2334	.2463	.2605	.2762	.2937	.3133	.3354	.3604
	49754.8	47424.4	45122.9	42850.0	40606.0	38390.7	36204.2	34046.6	31917.9	29818.2	27747.4
	9.74E-04	8.13E-03	3.21E-02	7.98E-02	1.40E-01	1.85E-01	1.91E-01	1.57E-01	1.06E-01	5.85E-02	2.70E-02
	1.1850	1.2019	1.2193	1.2372	1.2555	1.2744	1.2939	1.3141	1.3350	1.3566	1.3791
	-1.26E-06	-1.54E-05	-2.99E-05	-4.48E-05	-5.98E-05	-7.53E-05	-9.12E-05	-1.07E-04	-1.24E-04	-1.41E-04	-1.59E-04
	(2.58E-07)	2.79E-04	3.57E-03	1.70E-02	4.54E-02	8.01E-02	1.02E-01	9.68E-02	7.16E-02	4.19E-02	1.97E-02
	1.97E-07*	2.75E-04*	3.54E-03	1.69E-02	4.53E-02	8.01E-02	1.02E-01	9.69E-02	7.17E-02	4.20E-02	1.98E-02
1	.1954	.2047	.2148	.2258	.2379	.2511	.2657	.2819	.2998	.3200	.3427
	51187.7	48857.3	46555.8	44282.9	42038.9	39823.6	37637.1	35479.5	33350.8	31251.1	29180.3
	5.18E-03	3.21E-02	8.69E-02	1.31E-01	1.10E-01	4.02E-02	2.17E-05	3.66E-02	1.09E-01	1.50E-01	1.35E-01
	1.1746	1.1911	1.2079	1.2251	1.2426	1.2597	1.1668	1.3034	1.3223	1.3428	1.3643
	7.49E-06	-6.38E-06	-2.04E-05	-3.47E-05	-4.92E-05	-6.33E-05	1.41E-05	-9.88E-05	-1.14E-04	-1.30E-04	-1.48E-04
	5.27E-05	2.06E-04	4.95E-03	1.85E-02	2.69E-02	1.37E-02	(3.10E-07)	2.16E-02	7.13E-02	1.05E-01	9.87E-02
	5.47E-05*	1.97E-04	4.91E-03	1.85E-02	2.69E-02	1.38E-02	3.01E-09*	2.14E-02	7.12E-02	1.05E-01	9.87E-02
2	.1901	.1990	.2085	.2189	.2302	.2425	.2561	.2711	.2877	.3062	.3270
	52592.9	50262.6	47961.0	45688.2	43444.1	41228.8	39042.4	36884.8	34756.1	32656.3	30585.6
	1.47E-02	6.59E-02	1.14E-01	8.27E-02	1.13E-02	1.49E-02	7.76E-02	8.15E-02	2.20E-02	3.62E-03	6.18E-02
	1.1646	1.1806	1.1969	1.2133	1.2275	1.2537	1.2693	1.2871	1.3039	1.3396	1.3518
	1.59E-05	2.44E-06	-1.12E-05	-2.49E-05	-3.67E-05	-5.84E-05	-7.11E-05	-8.56E-05	-9.92E-05	-1.28E-04	-1.38E-04
	7.36E-04	6.72E-05	2.14E-03	6.63E-03	1.69E-03	4.81E-03	3.16E-02	4.05E-02	1.23E-02	2.79E-03	4.53E-02
	7.45E-04	6.97E-05	2.14E-03	6.66E-03	1.73E-03	4.73E-03	3.15E-02	4.06E-02	1.24E-02	2.73E-03*	4.51E-02
3	.1853	.1936	.2027	.2125	.2231	.2347	.2474	.2614	.2768	.2938	.3129
	53970.4	51640.1	49338.5	47065.7	44821.6	42606.3	40419.9	38262.3	36133.5	34033.8	31963.1
	2.99E-02	9.32E-02	9.01E-02	1.50E-02	1.53E-02	7.20E-02	4.55E-02	3.10E-05	4.24E-02	8.11E-02	3.68E-02
	1.1551	1.1706	1.1863	1.2003	1.2242	1.2388	1.2550	1.1644	1.2969	1.3145	1.3325
	2.40E-05	1.09E-05	-2.36E-06	-1.41E-05	-3.40E-05	-4.61E-05	-5.94E-05	1.61E-05	-9.36E-05	-1.08E-04	-1.22E-04
	3.65E-03	2.05E-03	8.11E-05	4.18E-04	2.15E-03	1.60E-02	1.43E-02	(6.08E-07)	2.37E-02	5.01E-02	2.42E-02
	3.70E-03	2.06E-03	8.19E-05	4.40E-04	2.10E-03	1.60E-02	1.44E-02	2.86E-09*	2.36E-02	5.02E-02	2.43E-02
4	.1808	.1887	.1973	.2065	.2166	.2275	.2394	.2524	.2668	.2826	.3002
	55320.1	52989.7	50688.1	48415.3	46171.3	43956.0	41769.5	39611.9	37483.2	35383.4	33312.7
	4.85E-02	1.00E-01	4.16E-02	2.89E-03	5.90E-02	4.13E-02	3.61E-04	4.89E-02	5.34E-02	2.41E-03	3.05E-02
	1.1459	1.1610	1.1756	1.2012	1.2110	1.2260	1.2755	1.2650	1.2811	1.2876	1.3251
	3.18E-05	1.90E-05	6.65E-06	-1.48E-05	-2.30E-05	-3.55E-05	-7.62E-05	-6.76E-05	-8.08E-05	-8.60E-05	-1.16E-04
	1.12E-02	7.27E-03	3.23E-04	(9.77E-05)	4.16E-03	5.97E-03	(2.06E-04)	1.88E-02	2.48E-02	1.07E-03	2.06E-02
	1.13E-02	7.29E-03	3.06E-04	8.56E-05*	4.11E-03	6.03E-03	1.87E-04*	1.86E-02	2.49E-02	1.11E-03*	2.04E-02
5	.1765	.1841	.1923	.2011	.2106	.2209	.2321	.2443	.2577	.2724	.2887
	56641.8	54311.4	52009.8	49737.0	47492.9	45277.7	43091.2	40933.6	38804.9	36705.1	34634.4
	6.70E-02	8.56E-02	6.49E-03	3.28E-02	5.30E-02	9.37E-04	3.81E-02	4.48E-02	1.15E-04	4.08E-02	5.10E-02
	1.1371	1.1517	1.1632	1.1854	1.1996	1.2003	1.2362	1.2510	1.2095	1.2914	1.3076
	3.93E-05	2.69E-05	1.71E-05	-1.60E-06	-1.35E-05	-1.41E-05	-4.39E-05	-5.61E-05	-2.18E-05	-8.91E-05	-1.02E-04
	2.54E-02	1.34E-02	3.62E-04	(1.39E-05)	1.40E-03	(2.33E-05)	7.95E-03	1.31E-02	(4.31E-06)	2.16E-02	2.99E-02
	2.55E-02	1.34E-02	3.39E-04*	1.05E-05	1.41E-03	3.08E-05*	7.86E-03	1.31E-02	7.97E-06*	2.15E-02	3.00E-02
6	.1726	.1798	.1876	.1960	.2050	.2147	.2253	.2368	.2494	.2632	.2783
	57935.3	55605.0	53303.4	51030.5	48786.5	46571.2	44384.8	42227.1	40098.4	37998.7	35928.0
	8.19E-02	5.81E-02	1.55E-03	5.49E-02	1.62E-02	1.69E-02	4.82E-02	1.91E-03	3.32E-02	4.04E-02	2.23E-06
	1.1286	1.1426	1.1681	1.1749	1.1876	1.2105	1.2236	1.2280	1.2615	1.2761	1.7893
	4.66E-05	3.46E-05	1.30E-05	7.24E-06	-3.45E-06	-2.26E-05	-3.35E-05	-3.72E-05	-6.48E-05	-7.67E-05	-4.58E-04
	4.67E-02	1.62E-02	(5.36E-05)	5.17E-04	(3.02E-05)	1.17E-03	6.39E-03	2.68E-04	1.21E-02	1.76E-02	(2.94E-05)
	4.68E-02	1.61E-02	6.35E-05*	5.24E-04	3.79E-05	1.13E-03	6.42E-03	2.92E-04*	1.20E-02	1.77E-02	2.63E-05*
7	.1689	.1758	.1833	.1912	.1998	.2090	.2191	.2299	.2418	.2547	.2689
	59200.5	56870.2	54568.6	52295.8	50051.7	47836.4	45650.0	43492.4	41363.6	39263.9	37193.2
	9.11E-02	2.97E-02	1.82E-02	4.74E-02	2.93E-05	4.33E-02	1.44E-02	1.62E-02	4.21E-02	4.27E-04	3.65E-02
	1.1205	1.1336	1.1525	1.1651	1.2652	1.1984	1.2106	1.2350	1.2478	1.2341	1.2868
	5.35E-05	4.23E-05	2.62E-05	1.55E-05	-6.78E-05	-1.25E-05	-2.27E-05	-4.29E-05	-5.35E-05	-4.22E-05	-8.54E-05
	7.31E-02	1.32E-02	2.74E-03	2.21E-03	(2.28E-05)	1.00E-03	9.50E-04	3.32E-03	1.15E-02	(6.22E-05)	1.85E-02
	7.33E-02	1.31E-02	2.81E-03	2.19E-03	1.68E-05*	9.83E-04	9.87E-04	3.25E-03	1.16E-02	7.46E-05*	1.84E-02

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	.3890	.4221	.4606	.5062	.5608	.6274	.7106	.8171	.9584	1.1548	1.4460
	25705.8	23693.4	21710.3	19756.6	17832.4	15937.9	14073.2	12238.4	10433.8	8659.5	6915.7
	1.04E-02	3.35E-03	9.06E-04	2.06E-04	3.90E-05	6.17E-06	8.06E-07	8.62E-08	7.47E-09	5.17E-10	2.71E-11
	1.4025	1.4270	1.4527	1.4797	1.5083	1.5386	1.5711	1.6062	1.6440	1.6849	1.7367
	-1.78E-04	-1.97E-04	-2.16E-04	-2.37E-04	-2.58E-04	-2.81E-04	-3.05E-04	-3.31E-04	-3.58E-04	-3.87E-04	-4.23E-04
	7.50E-03	2.32E-03	5.86E-04	1.20E-04	2.00E-05	2.67E-06	2.82E-07	2.33E-08	1.47E-09	6.78E-11	2.16E-12
	7.52E-03	2.33E-03*	5.88E-04*	1.21E-04*	2.01E-05*	2.68E-06*	2.84E-07*	2.34E-08*	1.48E-09*	6.82E-11*	2.18E-12*
1	.3685	.3980	.4321	.4719	.5191	.5757	.6449	.7315	.8427	.9908	1.1978
	27138.7	25126.3	23143.2	21189.5	19265.3	17370.8	15506.1	13671.3	11866.7	10092.4	8348.6
	8.97E-02	4.62E-02	1.90E-02	6.30E-03	1.71E-03	3.80E-04	6.91E-05	1.02E-05	1.23E-06	1.18E-07	8.99E-09
	1.3867	1.4101	1.4346	1.4603	1.4874	1.5160	1.5465	1.5791	1.6143	1.6526	1.6940
	-1.65E-04	-1.83E-04	-2.02E-04	-2.22E-04	-2.43E-04	-2.64E-04	-2.87E-04	-3.11E-04	-3.37E-04	-3.64E-04	-3.93E-04
	6.60E-02	3.33E-02	1.30E-02	4.00E-03	9.73E-04	1.88E-04	2.87E-05	3.42E-06	3.14E-07	2.17E-08	1.09E-09
	6.61E-02	3.33E-02	1.30E-02	4.01E-03*	9.76E-04*	1.89E-04*	2.88E-05*	3.43E-06*	3.16E-07*	2.18E-08*	1.10E-09*
2	.3503	.3769	.4074	.4426	.4838	.5326	.5913	.6633	.7535	.8697	1.0252
	28544.0	26531.5	24548.4	22594.7	20670.5	18776.0	16911.3	15076.6	13272.0	11497.6	9753.8
	1.27E-01	1.37E-01	1.00E-01	5.38E-02	2.23E-02	7.30E-03	1.91E-03	4.01E-04	6.76E-05	9.11E-06	9.71E-07
	1.3724	1.3946	1.4179	1.4423	1.4681	1.4952	1.5239	1.5545	1.5872	1.6225	1.6610
	-1.54E-04	-1.71E-04	-1.89E-04	-2.08E-04	-2.28E-04	-2.49E-04	-2.70E-04	-2.93E-04	-3.17E-04	-3.42E-04	-3.70E-04
	9.45E-02	1.02E-01	7.18E-02	3.64E-02	1.38E-02	4.04E-03	9.10E-04	1.59E-04	2.14E-05	2.19E-06	1.67E-07
	9.43E-02	1.02E-01	7.18E-02	3.64E-02	1.39E-02	4.05E-03*	9.13E-04*	1.60E-04*	2.15E-05*	2.20E-06*	1.67E-07*
3	.3342	.3583	.3857	.4171	.4536	.4962	.5468	.6078	.6826	.7767	.8984
	29921.5	27909.0	25925.9	23972.2	22048.0	20153.5	18288.8	16454.1	14649.4	12875.1	11131.3
	9.23E-05	4.58E-02	1.16E-01	1.35E-01	9.96E-02	5.28E-02	2.11E-02	6.56E-03	1.60E-03	3.07E-04	4.65E-05
	1.4392	1.3821	1.4030	1.4260	1.4503	1.4760	1.5032	1.5319	1.5626	1.5954	1.6310
	-2.06E-04	-1.62E-04	-1.78E-04	-1.96E-04	-2.14E-04	-2.34E-04	-2.55E-04	-2.76E-04	-2.99E-04	-3.23E-04	-3.49E-04
	1.42E-04	3.51E-02	8.66E-02	9.60E-02	6.63E-02	3.20E-02	1.13E-02	3.01E-03	6.05E-04	9.22E-05	1.05E-05
	1.30E-04*	3.49E-02	8.64E-02	9.59E-02	6.64E-02	3.21E-02	1.14E-02	3.02E-03*	6.07E-04*	9.26E-05*	1.06E-05*
4	.3198	.3418	.3666	.3949	.4274	.4650	.5092	.5617	.6250	.7030	.8012
	31271.1	29258.7	27275.6	25321.9	23397.7	21503.2	19638.5	17803.7	15999.1	14224.8	12481.0
	7.61E-02	3.80E-02	5.32E-05	4.65E-02	1.17E-01	1.31E-01	9.26E-02	4.63E-02	1.72E-02	4.89E-03	1.08E-03
	1.3425	1.3608	1.5097	1.4129	1.4346	1.4586	1.4842	1.5113	1.5402	1.5709	1.6039
	-1.30E-04	-1.45E-04	-2.60E-04	-1.86E-04	-2.02E-04	-2.21E-04	-2.40E-04	-2.61E-04	-2.82E-04	-3.05E-04	-3.29E-04
	5.33E-02	2.69E-02	9.83E-05	3.51E-02	8.29E-02	8.59E-02	5.47E-02	2.40E-02	7.58E-03	1.77E-03	3.06E-04
	5.33E-02	2.70E-02	8.94E-05*	3.50E-02	8.27E-02	8.59E-02	5.48E-02	2.40E-02	7.60E-03	1.77E-03*	3.07E-04*
5	.3068	.3270	.3497	.3753	.4045	.4381	.4771	.5229	.5773	.6432	.7245
	32592.8	30580.4	28597.3	26643.5	24719.4	22824.8	20960.1	19125.4	17320.8	15546.5	13802.6
	2.16E-03	3.15E-02	7.33E-02	3.06E-02	1.36E-03	5.83E-02	1.24E-01	1.25E-01	8.05E-02	3.65E-02	1.22E-02
	1.3121	1.3533	1.3711	1.3894	1.4444	1.4444	1.4673	1.4927	1.5197	1.5486	1.5794
	-1.06E-04	-1.39E-04	-1.53E-04	-1.67E-04	-2.10E-04	-2.10E-04	-2.27E-04	-2.47E-04	-2.67E-04	-2.89E-04	-3.11E-04
	1.13E-03	2.34E-02	5.41E-02	2.19E-02	1.23E-03	4.12E-02	7.98E-02	7.21E-02	4.03E-02	1.54E-02	4.20E-03
	1.18E-03*	2.33E-02	5.41E-02	2.20E-02	1.19E-03*	4.11E-02	7.97E-02	7.21E-02	4.04E-02	1.55E-02	4.22E-03
6	.2951	.3137	.3346	.3579	.3844	.4146	.4494	.4897	.5372	.5938	.6624
	33886.3	31873.9	29890.8	27937.1	26012.9	24118.4	22253.7	20419.0	18614.3	16840.0	15096.2
	4.25E-02	4.38E-02	1.98E-04	4.06E-02	6.93E-02	1.81E-02	8.03E-03	7.85E-02	1.31E-01	1.14E-01	6.47E-02
	1.3180	1.3343	1.2937	1.3817	1.4003	1.4175	1.4612	1.4770	1.5015	1.5284	1.5572
	-1.11E-04	-1.24E-04	-9.10E-05	-1.61E-04	-1.76E-04	-1.89E-04	-2.23E-04	-2.35E-04	-2.53E-04	-2.74E-04	-2.95E-04
	2.73E-02	2.93E-02	(5.91E-05)	3.11E-02	5.09E-02	1.23E-02	5.93E-03	4.98E-02	7.35E-02	5.52E-02	2.61E-02
	2.72E-02	2.94E-02	6.97E-05*	3.09E-02	5.09E-02	1.24E-02	5.86E-03*	4.96E-02	7.35E-02	5.53E-02	2.62E-02
7	.2845	.3018	.3210	.3424	.3666	.3940	.4252	.4612	.5030	.5523	.6112
	35151.6	33139.1	31156.0	29202.3	27278.1	25383.6	23518.9	21684.2	19879.5	18105.2	16361.4
	3.15E-02	1.64E-03	4.87E-02	3.17E-02	1.64E-03	5.44E-02	5.91E-02	5.24E-03	2.49E-02	1.03E-01	1.33E-01
	1.3014	1.3434	1.3449	1.3611	1.4105	1.4107	1.4301	1.4406	1.4896	1.5111	1.5375
	-9.72E-05	-1.31E-04	-1.32E-04	-1.45E-04	-1.84E-04	-1.84E-04	-1.99E-04	-2.07E-04	-2.44E-04	-2.61E-04	-2.80E-04
	1.75E-02	1.38E-03	3.47E-02	2.24E-02	1.52E-03	4.06E-02	4.11E-02	3.09E-03	1.58E-02	5.62E-02	6.20E-02
	1.76E-02	1.33E-03*	3.47E-02	2.25E-02	1.48E-03*	4.05E-02	4.12E-02	3.14E-03*	1.57E-02	5.61E-02	6.20E-02

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
8	.1655	.1721	.1792	.1868	.1950	.2038	.2133	.2236	.2347	.2469	.2602
	60437.1	58106.8	55805.2	53532.4	51288.3	49073.0	46886.6	44729.0	42600.3	40500.5	38429.8
	9.39E-02	9.34E-03	3.82E-02	2.33E-02	1.39E-02	3.76E-02	5.31E-04	4.05E-02	7.66E-03	2.22E-02	3.36E-02
	1.1126	1.1241	1.1430	1.1552	1.1758	1.1877	1.2274	1.2219	1.2322	1.2590	1.2721
	6.03E-05	5.04E-05	3.43E-05	2.39E-05	6.48E-06	-3.53E-06	-3.67E-05	-3.21E-05	-4.06E-05	-6.27E-05	-7.34E-05
	1.02E-01	6.30E-03	1.05E-02	2.76E-03	(1.07E-04)	7.49E-05	(9.93E-05)	5.04E-03	1.32E-03	7.84E-03	1.39E-02
	1.02E-01	6.21E-03*	1.06E-02	2.70E-03	1.20E-04	8.00E-05	8.49E-05*	5.02E-03	1.37E-03*	7.75E-03	1.40E-02
9	.1622	.1686	.1754	.1827	.1905	.1989	.2079	.2177	.2283	.2398	.2523
	61644.8	59314.4	57012.9	54740.0	52496.0	50280.7	48094.3	45936.6	43807.9	41708.2	39637.5
	9.10E-02	5.11E-04	4.84E-02	4.15E-03	3.37E-02	1.32E-02	1.88E-02	2.71E-02	4.21E-03	3.79E-02	1.25E-03
	1.1051	1.1059	1.1344	1.1430	1.1653	1.1765	1.1984	1.2103	1.2374	1.2456	1.2443
	6.68E-05	6.61E-05	4.16E-05	3.43E-05	1.54E-05	5.89E-06	-1.25E-05	-2.24E-05	-4.49E-05	-5.17E-05	-5.06E-05
	1.28E-01	6.29E-04	2.10E-02	1.08E-03	1.55E-03	(7.89E-05)	4.41E-04	1.79E-03	9.65E-04	9.93E-03	2.68E-04
	1.28E-01	5.96E-04*	2.10E-02	1.03E-03*	1.58E-03	6.76E-05	4.20E-04	1.83E-03	9.22E-04*	9.93E-03	2.93E-04*
10	.1592	.1653	.1718	.1788	.1863	.1943	.2030	.2122	.2223	.2332	.2450
	62823.2	60492.8	58191.2	55918.4	53674.3	51459.1	49272.6	47115.0	44986.3	42886.5	40815.8
	8.40E-02	1.93E-03	4.56E-02	5.96E-04	3.88E-02	1.31E-04	3.47E-02	3.75E-03	2.69E-02	1.43E-02	1.35E-02
	1.0979	1.1189	1.1263	1.1577	1.1561	1.1315	1.1876	1.1950	1.2212	1.2322	1.2578
	7.30E-05	5.49E-05	4.86E-05	2.18E-05	2.31E-05	4.41E-05	-3.45E-06	-9.65E-06	-3.15E-05	-4.06E-05	-6.17E-05
	1.50E-01	1.74E-03	2.86E-02	(6.68E-05)	4.34E-03	(4.69E-05)	6.66E-05	(4.93E-05)	3.29E-03	2.52E-03	4.73E-03
	1.50E-01	1.80E-03*	2.85E-02	7.96E-05*	4.34E-03	3.62E-05*	6.39E-05	6.06E-05*	3.24E-03	2.58E-03	4.65E-03
11	.1563	.1622	.1685	.1752	.1824	.1901	.1983	.2072	.2168	.2271	.2383
	63971.7	61641.4	59339.8	57066.9	54822.9	52607.6	50421.2	48263.5	46134.8	44035.1	41964.4
	7.44E-02	9.94E-03	3.38E-02	9.69E-03	2.79E-02	6.79E-03	2.86E-02	2.78E-03	3.14E-02	5.46E-05	3.23E-02
	1.0910	1.1078	1.1185	1.1373	1.1472	1.1684	1.1777	1.2037	1.2101	1.3074	1.2442
	7.90E-05	6.45E-05	5.52E-05	3.91E-05	3.07E-05	1.27E-05	4.88E-06	-1.69E-05	-2.23E-05	-1.02E-04	-5.05E-05
	1.64E-01	1.31E-02	2.91E-02	3.73E-03	5.85E-03	2.16E-04	1.18E-04	(1.21E-04)	2.07E-03	(6.56E-05)	8.23E-03
	1.64E-01	1.32E-02*	2.90E-02	3.80E-03*	5.80E-03	2.39E-04*	1.11E-04	1.05E-04*	2.07E-03	5.45E-05*	8.20E-03
12	.1536	.1593	.1654	.1719	.1788	.1861	.1940	.2025	.2116	.2215	.2321
	65089.9	62759.5	60458.0	58185.1	55941.1	53725.8	51539.3	49381.7	47253.0	45153.3	43082.6
	6.38E-02	2.05E-02	1.95E-02	2.24E-02	1.21E-02	2.12E-02	1.13E-02	1.82E-02	1.42E-02	1.33E-02	2.02E-02
	1.0844	1.1000	1.1108	1.1284	1.1379	1.1576	1.1673	1.1886	1.1989	1.2219	1.2322
	8.47E-05	7.12E-05	6.19E-05	4.68E-05	3.86E-05	2.19E-05	1.37E-05	-4.29E-06	-1.29E-05	-3.21E-05	-4.06E-05
	1.71E-01	3.47E-02	2.23E-02	1.31E-02	4.25E-03	2.13E-03	3.91E-04	(5.45E-05)	3.38E-04	1.70E-03	3.60E-03
	1.70E-01	3.49E-02	2.21E-02	1.32E-02	4.17E-03	2.17E-03	3.64E-04	4.66E-05	3.59E-04	1.65E-03	3.65E-03
13	.1511	.1566	.1625	.1687	.1754	.1824	.1900	.1981	.2069	.2163	.2264
	66177.1	63846.7	61545.1	59272.3	57028.2	54813.0	52626.5	50468.9	48340.2	46240.4	44169.7
	5.32E-02	3.05E-02	7.87E-03	3.12E-02	1.72E-03	2.95E-02	6.09E-04	2.81E-02	7.24E-04	2.69E-02	1.99E-03
	1.0780	1.0929	1.1029	1.1207	1.1241	1.1490	1.1446	1.1788	1.1756	1.2105	1.2133
	9.03E-05	7.73E-05	6.87E-05	5.34E-05	5.04E-05	2.92E-05	3.29E-05	3.95E-06	6.65E-06	-2.26E-05	-2.49E-05
	1.70E-01	6.41E-02	1.17E-02	2.50E-02	1.10E-03	5.59E-03	(1.30E-04)	7.62E-05	(4.88E-06)	1.83E-03	(1.44E-04)
	1.70E-01	6.43E-02	1.16E-02*	2.51E-02	1.05E-03*	5.63E-03	1.12E-04*	7.87E-05	1.99E-06*	1.81E-03	1.64E-04*
14	.1487	.1541	.1597	.1658	.1722	.1790	.1863	.1941	.2024	.2114	.2211
	67232.4	64902.1	62600.5	60327.7	58083.6	55868.4	53681.9	51524.3	49395.6	47295.8	45225.1
	4.35E-02	3.81E-02	1.35E-03	3.29E-02	6.16E-04	2.69E-02	2.79E-03	2.33E-02	3.91E-03	2.23E-02	3.46E-03
	1.0720	1.0864	1.0924	1.1135	1.1442	1.1409	1.1644	1.1697	1.1933	1.2004	1.2264
	9.55E-05	8.30E-05	7.78E-05	5.95E-05	3.33E-05	3.61E-05	1.61E-05	1.16E-05	-8.23E-06	-1.42E-05	-3.58E-05
	1.63E-01	9.68E-02	2.71E-03	3.46E-02	(1.80E-04)	8.24E-03	(1.51E-04)	5.82E-04	(4.31E-05)	6.40E-04	5.54E-04
	1.63E-01	9.70E-02	2.64E-03*	3.45E-02	2.01E-04*	8.20E-03	1.70E-04*	5.65E-04	3.39E-05*	6.56E-04	5.20E-04*
15	.1465	.1517	.1572	.1630	.1692	.1758	.1828	.1903	.1983	.2070	.2162
	68255.1	65924.8	63623.2	61350.4	59106.3	56891.1	54704.6	52547.0	50418.3	48318.5	46247.8
	3.49E-02	4.26E-02	1.40E-04	2.83E-02	6.45E-03	1.72E-02	1.23E-02	1.09E-02	1.55E-02	8.17E-03	1.67E-02
	1.0661	1.0802	1.1136	1.1068	1.1256	1.1330	1.1523	1.1603	1.1810	1.1895	1.2120
	1.01E-04	8.84E-05	5.95E-05	6.53E-05	4.92E-05	4.28E-05	2.64E-05	1.96E-05	2.10E-06	-5.04E-06	-2.39E-05
	1.52E-01	1.29E-01	1.72E-04	3.77E-02	4.35E-03	7.83E-03	1.90E-03	8.22E-04	(1.19E-05)	(3.16E-05)	1.27E-03
	1.52E-01	1.29E-01	1.91E-04*	3.76E-02	4.44E-03*	7.76E-03	1.95E-03	7.88E-04	1.53E-05	3.99E-05*	1.23E-03

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	.2748	.2909	.3087	.3285	.3507	.3757	.4040	.4363	.4736	.5170	.5682
	36388.2	34375.7	32392.6	30438.9	28514.7	26620.2	24755.5	22920.8	21116.2	19341.8	17598.0
	6.54E-04	4.24E-02	1.87E-02	9.29E-03	5.30E-02	1.58E-02	1.20E-02	6.64E-02	4.01E-02	1.09E-04	5.40E-02
	1.3213	1.3124	1.3262	1.3598	1.3723	1.3869	1.4256	1.4407	1.4602	1.6217	1.5221
	-1.13E-04	-1.06E-04	-1.17E-04	-1.44E-04	-1.54E-04	-1.65E-04	-1.95E-04	-2.07E-04	-2.22E-04	-3.42E-04	-2.69E-04
	5.46E-04	2.62E-02	1.18E-02	7.33E-03	3.93E-02	1.10E-02	9.39E-03	4.63E-02	2.51E-02	1.25E-04	2.87E-02
	5.15E-04*	2.61E-02	1.19E-02	7.22E-03*	3.93E-02	1.11E-02	9.29E-03	4.63E-02	2.52E-02	1.17E-04*	2.86E-02
9	.2660	.2810	.2976	.3160	.3364	.3594	.3852	.4144	.4480	.4866	.5318
	37595.8	35583.4	33600.3	31646.6	29722.4	27827.9	25963.2	24128.4	22323.8	20549.5	18805.7
	3.14E-02	2.08E-02	7.40E-03	4.42E-02	5.47E-03	2.47E-02	4.83E-02	2.42E-03	3.28E-02	6.75E-02	1.65E-02
	1.2832	1.2961	1.3276	1.3384	1.3469	1.3845	1.4002	1.4014	1.4527	1.4716	1.4883
	-8.25E-05	-9.29E-05	-1.18E-04	-1.27E-04	-1.34E-04	-1.63E-04	-1.76E-04	-1.77E-04	-2.16E-04	-2.31E-04	-2.43E-04
	1.53E-02	1.09E-02	5.30E-03	3.05E-02	3.47E-03	1.92E-02	3.52E-02	1.43E-03	2.30E-02	4.22E-02	8.76E-03
	1.53E-02	1.11E-02	5.21E-03*	3.05E-02	3.54E-03*	1.91E-02	3.53E-02	1.48E-03*	2.29E-02	4.22E-02	8.83E-03
10	.2579	.2720	.2875	.3046	.3236	.3448	.3684	.3952	.4255	.4602	.5004
	38774.2	36761.8	34778.6	32824.9	30900.8	29006.2	27141.5	25306.8	23502.2	21727.9	19984.0
	3.00E-02	1.06E-03	3.79E-02	6.76E-03	2.18E-02	3.59E-02	8.18E-05	4.26E-02	3.13E-02	2.10E-03	5.66E-02
	1.2692	1.3116	1.3080	1.3172	1.3506	1.3645	1.5028	1.4117	1.4280	1.4834	1.4828
	-7.11E-05	-1.05E-04	-1.03E-04	-1.10E-04	-1.37E-04	-1.48E-04	-2.54E-04	-1.85E-04	-1.97E-04	-2.40E-04	-2.39E-04
	1.19E-02	7.91E-04	2.26E-02	3.90E-03	1.62E-02	2.58E-02	1.43E-04	3.18E-02	2.13E-02	1.67E-03	3.49E-02
	1.20E-02	7.52E-04*	2.26E-02	3.98E-03*	1.61E-02	2.59E-02	1.30E-04*	3.17E-02	2.14E-02	1.63E-03*	3.48E-02
11	.2505	.2638	.2783	.2943	.3120	.3316	.3535	.3780	.4057	.4371	.4732
	39922.7	37910.3	35927.2	33973.5	32049.3	30154.8	28290.1	26455.4	24650.7	22876.4	21132.6
	2.92E-03	2.60E-02	1.56E-02	1.11E-02	3.41E-02	1.11E-06	3.72E-02	1.78E-02	1.02E-02	5.06E-02	9.39E-03
	1.2487	1.2807	1.2920	1.3217	1.3330	2.2446	1.3763	1.3896	1.4278	1.4403	1.4519
	-5.42E-05	-8.04E-05	-8.96E-05	-1.14E-04	-1.23E-04	-7.36E-04	-1.57E-04	-1.67E-04	-1.97E-04	-2.07E-04	-2.16E-04
	7.40E-04	1.24E-02	7.86E-03	7.55E-03	2.28E-02	2.22E-05	2.80E-02	1.25E-02	7.98E-03	3.50E-02	5.57E-03
	7.81E-04*	1.23E-02	7.96E-03	7.45E-03	2.29E-02	2.27E-05*	2.79E-02	1.26E-02	7.89E-03	3.50E-02	5.63E-03*
12	.2437	.2562	.2699	.2850	.3015	.3198	.3400	.3627	.3881	.4168	.4494
	41040.9	39028.5	37045.4	35091.7	33167.5	31273.0	29408.3	27573.5	25768.9	23994.6	22250.8
	6.60E-03	2.80E-02	7.44E-04	3.29E-02	2.38E-03	2.69E-02	1.86E-02	8.48E-03	4.06E-02	1.90E-03	3.24E-02
	1.2587	1.2673	1.3134	1.3047	1.3066	1.3452	1.3573	1.3927	1.4032	1.3997	1.4529
	-6.25E-05	-6.95E-05	-1.07E-04	-9.99E-05	-1.01E-04	-1.32E-04	-1.42E-04	-1.70E-04	-1.78E-04	-1.75E-04	-2.16E-04
	2.40E-03	1.08E-02	5.83E-04	1.91E-02	1.20E-03	1.95E-02	1.29E-02	6.93E-03	2.98E-02	1.09E-03	2.26E-02
	2.34E-03*	1.09E-02	5.50E-04*	1.91E-02	1.25E-03*	1.94E-02	1.30E-02	6.84E-03*	2.98E-02	1.13E-03*	2.25E-02
13	.2374	.2493	.2622	.2764	.2919	.3090	.3279	.3489	.3724	.3987	.4285
	42128.1	40115.7	38132.6	36178.8	34254.7	32360.2	30495.5	28660.7	26856.1	25081.8	23337.9
	2.49E-02	5.76E-03	2.03E-02	1.38E-02	1.16E-02	2.58E-02	1.97E-03	3.52E-02	2.63E-03	2.80E-02	2.57E-02
	1.2439	1.2512	1.2794	1.2894	1.3184	1.3289	1.3708	1.3705	1.3711	1.4160	1.4298
	-5.03E-05	-5.63E-05	-7.94E-05	-8.75E-05	-1.11E-04	-1.19E-04	-1.53E-04	-1.52E-04	-1.53E-04	-1.88E-04	-1.99E-04
	6.36E-03	1.59E-03	9.55E-03	6.74E-03	7.77E-03	1.68E-02	1.76E-03	2.60E-02	1.61E-03	2.11E-02	1.74E-02
	6.31E-03	1.64E-03*	9.47E-03	6.83E-03	7.67E-03	1.69E-02	1.71E-03*	2.60E-02	1.65E-03*	2.10E-02	1.75E-02
14	.2316	.2429	.2552	.2686	.2832	.2993	.3169	.3365	.3583	.3826	.4099
	43183.5	41171.1	39187.9	37234.2	35310.0	33415.5	31550.8	29716.1	27911.5	26137.2	24393.3
	2.36E-02	1.81E-03	2.63E-02	1.52E-04	2.85E-02	1.14E-03	2.66E-02	8.99E-03	1.70E-02	2.56E-02	2.94E-03
	1.2326	1.2654	1.2665	1.3450	1.3026	1.2969	1.3415	1.3506	1.3844	1.3960	1.4414
	-4.10E-05	-6.79E-05	-6.88E-05	-1.32E-04	-9.82E-05	-9.36E-05	-1.29E-04	-1.37E-04	-1.63E-04	-1.72E-04	-2.08E-04
	4.30E-03	7.87E-04	1.01E-02	(1.85E-04)	1.63E-02	5.05E-04	1.89E-02	5.95E-03	1.34E-02	1.83E-02	2.49E-03
	4.34E-03	7.47E-04*	1.01E-02	1.67E-04*	1.63E-02	5.37E-04*	1.89E-02	6.03E-03*	1.33E-02	1.84E-02	2.43E-03*
15	.2262	.2370	.2487	.2614	.2752	.2904	.3070	.3253	.3456	.3682	.3935
	44206.2	42193.8	40210.6	38256.9	36332.8	34438.2	32573.5	30738.8	28934.2	27159.9	25416.0
	7.85E-03	1.62E-02	9.70E-03	1.41E-02	1.40E-02	9.89E-03	2.09E-02	4.00E-03	2.90E-02	1.53E-05	3.23E-02
	1.2204	1.2449	1.2531	1.2796	1.2884	1.3170	1.3262	1.3612	1.3663	1.6553	1.4095
	-3.08E-05	-5.11E-05	-5.79E-05	-7.95E-05	-8.67E-05	-1.10E-04	-1.17E-04	-1.45E-04	-1.49E-04	-3.66E-04	-1.83E-04
	8.72E-04	4.29E-03	2.85E-03	6.74E-03	6.81E-03	6.58E-03	1.34E-02	3.30E-03	2.11E-02	(5.54E-05)	2.40E-02
	9.12E-04*	4.23E-03	2.92E-03*	6.65E-03	6.89E-03	6.49E-03*	1.35E-02	3.23E-03*	2.11E-02	4.95E-05*	2.40E-02

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	0	1	2	3	4	5	6	7	8	9	10
16	.1444	.1494	.1548	.1604	.1664	.1728	.1796	.1868	.1945	.2028	.2117
	69244.2	66913.8	64612.2	62339.4	60095.3	57880.1	55693.6	53536.0	51407.3	49307.5	47236.8
	2.76E-02	4.41E-02	2.97E-03	2.03E-02	1.45E-02	7.01E-03	2.06E-02	1.69E-03	2.25E-02	1.92E-04	2.28E-02
	1.0606	1.0743	1.0912	1.1004	1.1173	1.1244	1.1440	1.1457	1.1722	1.1517	1.2022
	1.05E-04	9.35E-05	7.88E-05	7.08E-05	5.63E-05	5.02E-05	3.34E-05	3.20E-05	9.52E-06	2.69E-05	-1.57E-05
	1.38E-01	1.56E-01	6.71E-03	3.34E-02	1.35E-02	4.63E-03	5.38E-03	3.58E-04	3.75E-04	(2.24E-05)	7.97E-04
	1.38E-01	1.56E-01	6.83E-03*	3.32E-02	1.36E-02	4.54E-03*	5.42E-03	3.30E-04*	3.83E-04	1.52E-05*	7.96E-04
17	.1425	.1473	.1525	.1580	.1638	.1700	.1765	.1835	.1910	.1990	.2075
	70198.4	67868.0	65566.4	63293.6	61049.6	58834.3	56647.8	54490.2	52361.5	50261.8	48191.0
	2.16E-02	4.32E-02	8.08E-03	1.20E-02	2.08E-02	1.00E-03	2.28E-02	4.91E-04	2.00E-02	3.24E-03	1.66E-02
	1.0552	1.0687	1.0836	1.0942	1.1105	1.1100	1.1367	1.1722	1.1640	1.1875	1.1931
	1.10E-04	9.84E-05	8.54E-05	7.62E-05	6.21E-05	6.26E-05	3.97E-05	9.52E-06	1.65E-05	-3.36E-06	-8.06E-06
	1.23E-01	1.77E-01	2.24E-02	2.38E-02	2.47E-02	1.08E-03	8.80E-03	(9.72E-06)	1.05E-03	(6.28E-06)	1.63E-04
	1.22E-01	1.77E-01	2.26E-02*	2.36E-02	2.49E-02	1.03E-03*	8.80E-03	1.49E-05*	1.04E-03	3.24E-06*	1.72E-04
18	.1406	.1454	.1504	.1557	.1614	.1674	.1737	.1805	.1877	.1954	.2036
	71116.5	68786.1	66484.6	64211.7	61967.7	59752.4	57565.9	55408.3	53279.6	51179.9	49109.1
	1.68E-02	4.06E-02	1.39E-02	5.30E-03	2.35E-02	3.15E-04	1.89E-02	5.54E-03	1.17E-02	1.15E-02	6.18E-03
	1.0501	1.0634	1.0775	1.0882	1.1043	1.1394	1.1298	1.1502	1.1557	1.1761	1.1829
	1.15E-04	1.03E-04	9.07E-05	8.14E-05	6.75E-05	3.74E-05	4.56E-05	2.82E-05	2.35E-05	6.23E-06	5.03E-07
	1.07E-01	1.89E-01	4.53E-02	1.26E-02	3.43E-02	(1.27E-04)	1.01E-02	1.01E-03	1.31E-03	(8.07E-05)	(2.50E-07)
	1.07E-01	1.89E-01	4.56E-02	1.24E-02*	3.44E-02	1.43E-04*	1.01E-02	1.05E-03*	1.27E-03	8.99E-05	2.41E-08*
19	.1389	.1435	.1484	.1536	.1591	.1649	.1711	.1777	.1846	.1921	.2000
	71997.1	69666.7	67365.1	65092.3	62848.3	60633.0	58446.5	56288.9	54160.2	52060.5	49989.7
	1.29E-02	3.69E-02	1.92E-02	1.31E-03	2.23E-02	3.56E-03	1.20E-02	1.21E-02	3.74E-03	1.73E-02	3.17E-04
	1.0453	1.0583	1.0719	1.0818	1.0986	1.1176	1.1231	1.1417	1.1457	1.1681	1.1546
	1.19E-04	1.07E-04	9.56E-05	8.70E-05	7.24E-05	5.60E-05	5.13E-05	3.54E-05	3.20E-05	1.30E-05	2.44E-05
	9.22E-02	1.95E-01	7.23E-02	3.69E-03	3.92E-02	3.36E-03	8.53E-03	3.66E-03	8.21E-04	5.55E-04	(3.19E-05)
	9.21E-02	1.95E-01	7.25E-02	3.61E-03*	3.91E-02	3.44E-03*	8.45E-03	3.71E-03	7.84E-04*	5.69E-04	2.36E-05*
20	.1373	.1418	.1466	.1517	.1570	.1627	.1687	.1750	.1818	.1890	.1967
	72838.6	70508.2	68206.6	65933.8	63689.7	61474.5	59288.0	57130.4	55001.7	52901.9	50831.2
	9.93E-03	3.27E-02	2.32E-02	3.28E-06	1.85E-02	8.38E-03	5.46E-03	1.64E-02	1.32E-04	1.72E-02	1.50E-03
	1.0406	1.0535	1.0667	1.0384	1.0934	1.1098	1.1159	1.1349	1.1052	1.1608	1.1876
	1.23E-04	1.12E-04	1.00E-04	1.25E-04	7.69E-05	6.27E-05	5.75E-05	4.12E-05	6.67E-05	1.92E-05	-3.45E-06
	7.84E-02	1.93E-01	9.98E-02	(1.98E-05)	3.81E-02	1.03E-02	5.08E-03	6.99E-03	(1.32E-04)	1.27E-03	(3.15E-06)
	7.82E-02*	1.93E-01	1.00E-01	1.39E-05*	3.81E-02	1.05E-02*	4.99E-03*	7.02E-03	1.15E-04*	1.26E-03	1.12E-06*
21	.1358	.1402	.1449	.1498	.1551	.1606	.1664	.1726	.1792	.1862	.1937
	73639.2	71308.8	69007.3	66734.4	64490.4	62275.1	60088.6	57931.0	55802.3	53702.6	51631.8
	7.58E-03	2.83E-02	2.58E-02	8.27E-04	1.35E-02	1.27E-02	1.29E-03	1.68E-02	1.10E-03	1.26E-02	6.64E-03
	1.0362	1.0489	1.0619	1.0764	1.0885	1.1038	1.1060	1.1289	1.1561	1.1539	1.1746
	1.27E-04	1.16E-04	1.04E-04	9.17E-05	8.11E-05	6.79E-05	6.60E-05	4.63E-05	2.31E-05	2.50E-05	7.49E-06
	6.58E-02	1.86E-01	1.25E-01	2.79E-03	3.22E-02	1.91E-02	1.65E-03	9.48E-03	(1.39E-04)	1.65E-03	(6.94E-05)
	6.57E-02*	1.86E-01	1.25E-01	2.87E-03*	3.20E-02	1.92E-02	1.59E-03*	9.48E-03	1.55E-04*	1.62E-03	7.99E-05*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 2. Radiative transition parameters for N_2 $A\ ^3\Sigma_u^+ - X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
16	.2213	.2316	.2427	.2548	.2679	.2823	.2980	.3152	.3342	.3553	.3787
	45195.2	43182.8	41199.7	39246.0	37321.8	35427.3	33562.6	31727.8	29923.2	28148.9	26405.0
	2.40E-07	2.29E-02	1.66E-07	2.37E-02	1.10E-04	2.45E-02	1.15E-03	2.40E-02	4.97E-03	2.01E-02	1.40E-02
	.1252	1.2339	2.8299	1.2670	1.2132	1.3019	1.2959	1.3394	1.3450	1.3802	1.3898
	1.05E-03	-4.20E-05	-1.01E-03	-6.93E-05	-2.49E-05	-9.76E-05	-9.28E-05	-1.28E-04	-1.32E-04	-1.60E-04	-1.68E-04
	(3.27E-05)	4.41E-03	(1.60E-05)	9.26E-03	(4.78E-06)	1.40E-02	5.04E-04	1.69E-02	3.14E-03	1.55E-02	9.79E-03
	1.62E-05*	4.41E-03	2.13E-05*	9.25E-03	8.78E-06*	1.40E-02	5.35E-04*	1.68E-02	3.21E-03*	1.54E-02	9.88E-03
17	.2167	.2266	.2372	.2488	.2613	.2749	.2897	.3060	.3239	.3436	.3655
	46149.4	44137.0	42153.9	40200.2	38276.0	36381.5	34516.8	32682.0	30877.4	29103.1	27359.3
	5.95E-03	1.44E-02	7.55E-03	1.40E-02	7.84E-03	1.54E-02	6.72E-03	1.87E-02	4.15E-03	2.37E-02	1.01E-03
	1.2160	1.2237	1.2480	1.2554	1.2819	1.2889	1.3180	1.3251	1.3589	1.3638	1.4168
	-2.72E-05	-3.36E-05	-5.37E-05	-5.97E-05	-8.14E-05	-8.71E-05	-1.11E-04	-1.16E-04	-1.43E-04	-1.47E-04	-1.89E-04
	5.84E-04	1.89E-03	2.20E-03	4.39E-03	3.94E-03	7.62E-03	4.56E-03	1.19E-02	3.38E-03	1.70E-02	9.98E-04
	5.52E-04*	1.93E-03	2.14E-03*	4.45E-03	3.86E-03*	7.69E-03	4.48E-03*	1.20E-02	3.31E-03*	1.71E-02	9.62E-04*
18	.2125	.2220	.2322	.2432	.2551	.2681	.2822	.2976	.3145	.3331	.3536
	47067.5	45055.1	43072.0	41118.3	39194.1	37299.6	35434.9	33600.1	31795.5	30021.2	28277.4
	1.55E-02	3.14E-03	1.77E-02	1.83E-03	1.91E-02	1.54E-03	2.00E-02	2.08E-03	2.03E-02	3.94E-03	1.91E-02
	1.2051	1.2105	1.2363	1.2371	1.2688	1.2661	1.3027	1.3022	1.3390	1.3429	1.3782
	-1.81E-05	-2.26E-05	-4.40E-05	-4.47E-05	-7.07E-05	-6.85E-05	-9.83E-05	-9.79E-05	-1.27E-04	-1.31E-04	-1.58E-04
	7.14E-04	1.98E-04	3.70E-03	3.44E-04	7.75E-03	5.07E-04	1.16E-02	1.02E-03	1.43E-02	2.46E-03	1.47E-02
	6.97E-04	2.19E-04*	3.67E-03	3.71E-04*	7.71E-03	5.39E-04*	1.15E-02	1.06E-03*	1.42E-02	2.51E-03*	1.46E-02
19	.2086	.2177	.2275	.2381	.2495	.2619	.2754	.2900	.3060	.3236	.3430
	47948.1	45935.7	43952.6	41998.9	40074.7	38180.2	36315.5	34480.7	32676.1	30901.8	29158.0
	1.85E-02	2.31E-04	1.79E-02	1.40E-03	1.70E-02	2.55E-03	1.70E-02	3.08E-03	1.81E-02	2.71E-03	2.05E-02
	1.1966	1.2442	1.2269	1.2586	1.2583	1.2892	1.2908	1.3231	1.3257	1.3613	1.3631
	-1.10E-05	-5.05E-05	-3.62E-05	-6.24E-05	-6.21E-05	-8.73E-05	-8.86E-05	-1.15E-04	-1.17E-04	-1.45E-04	-1.47E-04
	3.34E-04	(7.73E-05)	2.69E-03	5.45E-04	5.72E-03	1.46E-03	8.65E-03	2.25E-03	1.16E-02	2.27E-03	1.47E-02
	3.31E-04	6.48E-05*	2.70E-03	5.13E-04*	5.75E-03	1.41E-03*	8.70E-03	2.19E-03*	1.17E-02	2.22E-03*	1.48E-02
20	.2050	.2138	.2232	.2334	.2444	.2563	.2691	.2831	.2984	.3150	.3333
	48789.6	46777.2	44794.1	42840.4	40916.2	39021.7	37157.0	35322.2	33517.6	31743.3	29999.4
	1.39E-02	5.46E-03	9.80E-03	9.30E-03	6.75E-03	1.22E-02	4.98E-03	1.43E-02	4.32E-03	1.56E-02	4.73E-03
	1.1885	1.2108	1.2176	1.2405	1.2470	1.2723	1.2768	1.3053	1.3091	1.3404	1.3450
	-4.20E-06	-2.29E-05	-2.85E-05	-4.75E-05	-5.28E-05	-7.36E-05	-7.73E-05	-1.00E-04	-1.03E-04	-1.29E-04	-1.32E-04
	3.85E-05	3.94E-04	9.68E-04	2.23E-03	1.74E-03	5.31E-03	2.06E-03	8.57E-03	2.35E-03	1.11E-02	3.01E-03
	4.20E-05	3.68E-04*	9.99E-04*	2.18E-03*	1.79E-03*	5.26E-03	2.11E-03*	8.51E-03	2.41E-03*	1.11E-02	3.07E-03*
21	.2017	.2102	.2193	.2291	.2397	.2511	.2635	.2768	.2914	.3073	.3247
	49590.2	47577.8	45594.7	43641.0	41716.8	39822.3	37957.6	36122.8	34318.2	32543.9	30800.1
	6.43E-03	1.20E-02	2.13E-03	1.51E-02	2.93E-04	1.65E-02	2.42E-05	1.70E-02	3.97E-04	1.76E-02	7.66E-04
	1.1798	1.2014	1.2049	1.2311	1.2140	1.2623	1.4159	1.2943	1.3493	1.3281	1.3758
	3.11E-06	-1.50E-05	-1.79E-05	-3.97E-05	-2.55E-05	-6.54E-05	-1.88E-04	-9.15E-05	-1.36E-04	-1.19E-04	-1.57E-04
	(1.03E-05)	3.94E-04	(8.79E-05)	2.68E-03	(1.87E-05)	6.01E-03	(6.30E-05)	9.08E-03	3.98E-04	1.16E-02	7.41E-04
	7.14E-06*	3.78E-04	1.01E-04*	2.67E-03	2.55E-05*	6.00E-03	5.45E-05*	9.09E-03	3.75E-04*	1.16E-02	7.10E-04*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g - A\ ^3\Sigma_u^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	1.0469	1.2317	1.4895	1.8739	2.5084	3.7523	7.2916	94.1292	-8.8467	-4.2771	-2.8438
	9552.0	8119.1	6713.8	5336.3	3986.7	2665.0	1371.4	106.2	-1130.4	-2338.0	-3516.4
	4.01E-01	3.30E-01	1.66E-01	6.72E-02	2.41E-02	8.09E-03	2.62E-03	8.31E-04	2.63E-04	8.36E-05	2.69E-05
	1.2534	1.2160	1.1827	1.1526	1.1253	1.1002	1.0772	1.0558	1.0360	1.0175	1.0004
	2.68E-01	2.76E-01	2.83E-01	2.88E-01	2.93E-01	2.97E-01	3.01E-01	3.04E-01	3.07E-01	3.09E-01	3.11E-01
	5.09E+04	2.73E+04	8.15E+03	1.72E+03	2.66E+02	2.75E+01	1.24E+00	1.87E-04	-1.45E-01	-4.14E-01	-4.59E-01
	5.08E+04	2.73E+04	8.16E+03	1.73E+03	2.68E+02	2.76E+01*	1.25E+00*	1.88E-04*	-1.46E-01*	-4.18E-01*	-4.64E-01*
1	.8883	1.0179	1.1878	1.4201	1.7569	2.2882	3.2502	5.5202	17.3933	-15.8042	-5.5215
	11257.3	9824.4	8419.1	7041.6	5692.0	4370.3	3076.8	1811.5	574.9	-632.7	-1811.1
	4.00E-01	2.87E-03	1.59E-01	1.96E-01	1.30E-01	6.57E-02	2.86E-02	1.14E-02	4.31E-03	1.59E-03	5.78E-04
	1.2979	1.3088	1.2273	1.1920	1.1613	1.1336	1.1085	1.0854	1.0640	1.0443	1.0259
	2.58E-01	2.56E-01	2.74E-01	2.81E-01	2.87E-01	2.92E-01	2.96E-01	3.00E-01	3.03E-01	3.06E-01	3.08E-01
	7.70E+04	3.60E+02	1.44E+04	1.09E+04	4.00E+03	9.46E+02	1.48E+02	1.23E+01	1.52E-01	-1.52E-01	-1.32E+00
	7.70E+04	3.45E+02*	1.43E+04	1.09E+04	4.01E+03	9.49E+02	1.48E+02	1.24E+01	1.54E-01*	-1.54E-01*	-1.33E+00*
2	.7732	.8695	.9905	1.1471	1.3572	1.6538	2.1039	2.8671	4.4420	9.5828	-74.1757
	12933.5	11500.7	10095.4	8717.9	7368.3	6046.6	4753.0	3487.8	2251.2	1043.5	-134.8
	1.61E-01	2.76E-01	6.90E-02	2.19E-02	1.24E-01	1.43E-01	1.01E-01	5.63E-02	2.74E-02	1.22E-02	5.20E-03
	1.3475	1.3087	1.2571	1.2486	1.2027	1.1705	1.1424	1.1170	1.0938	1.0725	1.0528
	2.46E-01	2.56E-01	2.67E-01	2.69E-01	2.79E-01	2.85E-01	2.90E-01	2.95E-01	2.98E-01	3.02E-01	3.05E-01
	4.28E+04	5.55E+04	1.03E+04	2.13E+03	7.82E+03	5.19E+03	1.85E+03	4.20E+02	5.63E+01	2.57E+00	-4.79E-03
	4.29E+04	5.54E+04	1.03E+04	2.10E+03	7.79E+03	5.19E+03	1.85E+03	4.22E+02	5.66E+01	2.58E+00	-4.83E-03*
3	.6858	.7606	.8516	.9648	1.1092	1.2997	1.5624	1.9474	2.5651	3.7163	6.6117
	14580.8	13147.9	11742.7	10365.2	9015.6	7693.9	6400.3	5135.1	3898.5	2690.8	1512.5
	3.39E-02	2.77E-01	9.61E-02	1.52E-01	5.19E-03	4.22E-02	1.07E-01	1.11E-01	8.00E-02	4.73E-02	2.49E-02
	1.4035	1.3567	1.3235	1.2708	1.1981	1.2175	1.1808	1.1516	1.1258	1.1025	1.0811
	2.32E-01	2.44E-01	2.52E-01	2.64E-01	2.80E-01	2.76E-01	2.83E-01	2.89E-01	2.93E-01	2.97E-01	3.00E-01
	1.15E+04	7.61E+04	2.00E+04	2.39E+04	6.02E+02	2.96E+03	4.58E+03	2.54E+03	8.26E+02	1.65E+02	1.58E+01
	1.16E+04	7.61E+04	1.99E+04	2.40E+04	6.24E+02*	2.93E+03	4.56E+03	2.54E+03	8.28E+02	1.66E+02	1.58E+01
4	.6173	.6772	.7484	.8345	.9404	1.0739	1.2471	1.4807	1.8126	2.3207	3.1941
	16199.1	14766.2	13361.0	11983.5	10633.9	9312.2	8018.6	6753.4	5516.8	4309.1	3130.8
	4.04E-03	9.67E-02	2.98E-01	7.60E-03	1.51E-01	5.12E-02	2.19E-03	5.47E-02	9.36E-02	8.96E-02	6.49E-02
	1.4684	1.4124	1.3666	1.3676	1.2827	1.2353	1.2740	1.1933	1.1617	1.1352	1.1116
	2.16E-01	2.30E-01	2.42E-01	2.41E-01	2.62E-01	2.72E-01	2.64E-01	2.81E-01	2.87E-01	2.92E-01	2.96E-01
	1.62E+03	3.34E+04	8.41E+04	1.54E+03	2.52E+04	6.20E+03	1.59E+02	2.69E+03	2.62E+03	1.23E+03	3.53E+02
	1.63E+03*	3.35E+04	8.40E+04	1.50E+03*	2.52E+04	6.26E+03	1.50E+02*	2.67E+03	2.61E+03	1.23E+03	3.54E+02
5	.5622	.6114	.6689	.7368	.8181	.9173	1.0408	1.1987	1.4072	1.6954	2.1186
	17788.4	16355.5	14950.3	13572.8	12223.1	10901.5	9607.9	8342.7	7106.1	5898.4	4720.1
	2.74E-04	1.62E-02	1.69E-01	2.44E-01	1.04E-02	9.55E-02	9.48E-02	8.77E-03	1.39E-02	5.93E-02	8.09E-02
	1.5458	1.4772	1.4215	1.3775	1.2875	1.2959	1.2492	1.1919	1.2143	1.1733	1.1453
	1.96E-01	2.14E-01	2.28E-01	2.39E-01	2.60E-01	2.59E-01	2.69E-01	2.81E-01	2.76E-01	2.85E-01	2.90E-01
	1.19E+02	6.57E+03	5.93E+04	7.05E+04	2.62E+03	1.68E+04	1.23E+04	8.15E+02	7.74E+02	2.00E+03	1.45E+03
	1.20E+02*	6.59E+03	5.95E+04	7.03E+04	2.69E+03	1.66E+04	1.24E+04	8.37E+02*	7.58E+02	1.98E+03	1.45E+03
6	.5168	.5582	.6057	.6608	.7255	.8025	.8954	1.0098	1.1539	1.3407	1.5923
	19348.6	17915.7	16510.5	15133.0	13783.3	12461.7	11168.1	9902.9	8666.3	7458.6	6280.3
	1.01E-05	1.43E-03	3.89E-02	2.30E-01	1.57E-01	5.81E-02	3.55E-02	1.04E-01	3.95E-02	1.75E-08	2.48E-02
	1.6441	1.5549	1.4862	1.4310	1.3903	1.3214	1.3149	1.2614	1.2181	22.1050	1.1888
	1.70E-01	1.93E-01	2.11E-01	2.25E-01	2.36E-01	2.53E-01	2.54E-01	2.66E-01	2.76E-01	0.00E+00	2.82E-01
	4.26E+00	6.20E+02	1.58E+04	8.19E+04	4.62E+04	1.45E+04	6.46E+03	1.46E+04	3.95E+03	(0.00E+00)	9.86E+02
	4.23E+00*	6.22E+02*	1.59E+04	8.21E+04	4.60E+04	1.47E+04	6.37E+03	1.46E+04	3.99E+03	6.68E-01*	9.72E+02
7	.4789	.5142	.5543	.6001	.6530	.7147	.7875	.8746	.9806	1.1124	1.2802
	20879.7	19446.8	18041.6	16664.1	15314.4	13992.7	12699.2	11434.0	10197.4	8989.7	7811.3
	1.74E-07	6.42E-05	4.32E-03	7.16E-02	2.66E-01	7.47E-02	1.06E-01	3.08E-03	8.16E-02	6.78E-02	1.08E-02
	1.7837	1.6539	1.5641	1.4954	1.4410	1.4071	1.3368	1.3797	1.2744	1.2324	1.1840
	1.35E-01	1.67E-01	1.91E-01	2.09E-01	2.23E-01	2.32E-01	2.49E-01	2.38E-01	2.63E-01	2.73E-01	2.83E-01
	5.85E-02	2.68E+01	1.87E+03	2.93E+04	9.60E+04	2.22E+04	2.72E+04	5.30E+02	1.22E+04	7.42E+03	8.34E+02
	5.58E-02*	2.66E+01*	1.87E+03*	2.93E+04	9.61E+04	2.20E+04	2.73E+04	5.02E+02*	1.21E+04	7.44E+03	8.54E+02

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g - A\ ^3\Sigma_u^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	-2.1436	-1.7292	-1.4555	-1.2617	-1.1175	-1.0063	-.9181	-.8468	-.7880	-.7390	-.6977
	-4665.0	-5783.1	-6870.3	-7925.7	-8948.4	-9937.4	-10891.6	-11809.7	-12690.3	-13531.8	-14332.4
	8.85E-06	2.99E-06	1.04E-06	3.78E-07	1.43E-07	5.61E-08	2.29E-08	9.63E-09	4.12E-09	1.76E-09	7.24E-10
	.9847	.9706	.9581	.9475	.9387	.9318	.9263	.9215	.9164	.9096	.8987
	3.13E-01	3.14E-01	3.15E-01	3.16E-01	3.17E-01	3.18E-01	3.18E-01	3.18E-01	3.19E-01	3.19E-01	3.20E-01
	-3.56E-01	-2.31E-01	-1.36E-01	-7.63E-02	-4.16E-02	-2.25E-02	-1.21E-02	-6.52E-03	-3.47E-03	-1.80E-03	-8.83E-04
	-3.61E-01*	-2.34E-01*	-1.38E-01*	-7.73E-02*	-4.21E-02*	-2.27E-02*	-1.22E-02*	-6.57E-03*	-3.49E-03*	-1.81E-03*	-8.90E-04*
1	-3.3788	-2.4523	-1.9361	-1.6076	-1.3806	-1.2148	-1.0886	-.9897	-.9103	-.8456	-.7919
	-2959.6	-4077.8	-5165.0	-6220.4	-7243.1	-8232.1	-9186.3	-10104.4	-10985.0	-11826.5	-12627.1
	2.10E-04	7.71E-05	2.88E-05	1.10E-05	4.31E-06	1.74E-06	7.25E-07	3.10E-07	1.35E-07	5.94E-08	2.57E-08
	1.0090	.9934	.9792	.9665	.9553	.9456	.9373	.9300	.9231	.9159	.9067
	3.10E-01	3.12E-01	3.13E-01	3.15E-01	3.16E-01	3.17E-01	3.17E-01	3.18E-01	3.18E-01	3.19E-01	3.19E-01
	-2.12E+00	-2.06E+00	-1.58E+00	-1.06E+00	-6.61E-01	-3.94E-01	-2.29E-01	-1.31E-01	-7.36E-02	-4.04E-02	-2.14E-02
	-2.15E+00*	-2.09E+00*	-1.60E+00*	-1.07E+00*	-6.69E-01*	-3.99E-01*	-2.32E-01*	-1.32E-01*	-7.43E-02*	-4.08E-02*	-2.16E-02*
2	-7.7920	-4.1640	-2.8664	-2.2007	-1.7964	-1.5254	-1.3316	-1.1865	-1.0743	-.9852	-.9132
	-1283.4	-2401.6	-3488.7	-4544.1	-5566.8	-6555.8	-7510.0	-8428.2	-9308.7	-10150.2	-10950.8
	2.15E-03	8.77E-04	3.57E-04	1.46E-04	6.08E-05	2.57E-05	1.11E-05	4.90E-06	2.20E-06	9.93E-07	4.47E-07
	1.0345	1.0177	1.0021	.9879	.9750	.9634	.9530	.9436	.9349	.9262	.9166
	3.07E-01	3.09E-01	3.11E-01	3.13E-01	3.14E-01	3.15E-01	3.16E-01	3.17E-01	3.17E-01	3.18E-01	3.19E-01
	-1.74E+00	-4.70E+00	-5.94E+00	-5.44E+00	-4.19E+00	-2.92E+00	-1.90E+00	-1.19E+00	-7.23E-01	-4.26E-01	-2.41E-01
	-1.75E+00*	-4.75E+00*	-6.00E+00*	-5.50E+00*	-4.24E+00*	-2.95E+00*	-1.93E+00*	-1.21E+00*	-7.32E-01*	-4.31E-01*	-2.44E-01*
3	27.4786	-13.2578	-5.4305	-3.4521	-2.5513	-2.0373	-1.7057	-1.4747	-1.3052	-1.1761	-1.0749
	363.9	-754.3	-1841.4	-2896.8	-3919.5	-4908.5	-5862.7	-6780.9	-7661.5	-8502.9	-9303.6
	1.22E-02	5.68E-03	2.58E-03	1.16E-03	5.21E-04	2.35E-04	1.07E-04	4.93E-05	2.30E-05	1.08E-05	5.06E-06
	1.0615	1.0433	1.0266	1.0111	.9968	.9838	.9718	.9608	.9505	.9406	.9304
	3.03E-01	3.06E-01	3.08E-01	3.10E-01	3.12E-01	3.13E-01	3.14E-01	3.15E-01	3.16E-01	3.17E-01	3.18E-01
	1.09E-01	-9.24E-01	-6.20E+00	-1.10E+01	-1.23E+01	-1.10E+01	-8.62E+00	-6.18E+00	-4.18E+00	-2.70E+00	-1.67E+00
	1.10E-01	-9.31E-01*	-6.26E+00*	-1.11E+01*	-1.25E+01*	-1.11E+01*	-8.72E+00*	-6.26E+00*	-4.23E+00*	-2.73E+00*	-1.69E+00*
4	5.0449	11.5737	-44.8147	-7.8216	-4.3455	-3.0393	-2.3560	-1.9370	-1.6548	-1.4525	-1.3012
	1982.2	864.0	-223.1	-1278.5	-2301.2	-3290.2	-4244.5	-5162.6	-6043.2	-6884.6	-7685.3
	4.02E-02	2.25E-02	1.18E-02	5.99E-03	2.96E-03	1.45E-03	7.07E-04	3.46E-04	1.70E-04	8.35E-05	4.11E-05
	1.0901	1.0705	1.0523	1.0356	1.0202	1.0059	.9927	.9805	.9690	.9580	.9471
	2.99E-01	3.02E-01	3.05E-01	3.07E-01	3.09E-01	3.11E-01	3.12E-01	3.13E-01	3.14E-01	3.15E-01	3.16E-01
	5.67E+01	2.68E+00	-4.95E-02	-4.78E+00	-1.40E+01	-2.02E+01	-2.13E+01	-1.89E+01	-1.50E+01	-1.10E+01	-7.56E+00
	5.69E+01	2.70E+00	-4.98E-02	-4.82E+00*	-1.41E+01*	-2.04E+01*	-2.16E+01*	-1.91E+01*	-1.52E+01*	-1.11E+01*	-7.65E+00*
5	2.7999	4.0761	7.3199	32.1787	-14.0462	-5.8790	-3.7662	-2.7985	-2.2452	-1.8884	-1.6404
	3571.5	2453.3	1366.1	310.8	-711.9	-1701.0	-2655.2	-3573.3	-4453.9	-5295.4	-6096.0
	7.35E-02	5.39E-02	3.47E-02	2.05E-02	1.15E-02	6.28E-03	3.34E-03	1.76E-03	9.22E-04	4.81E-04	2.50E-04
	1.1211	1.0995	1.0798	1.0616	1.0449	1.0295	1.0152	1.0019	.9894	.9776	.9661
	2.94E-01	2.98E-01	3.01E-01	3.03E-01	3.06E-01	3.08E-01	3.09E-01	3.11E-01	3.12E-01	3.14E-01	3.15E-01
	5.87E+02	1.43E+02	1.62E+01	1.15E-01	-1.58E+00	-1.18E+01	-2.43E+01	-3.15E+01	-3.22E+01	-2.85E+01	-2.27E+01
	5.87E+02	1.43E+02	1.63E+01	1.16E-01	-1.59E+00	-1.19E+01*	-2.45E+01*	-3.18E+01*	-3.25E+01*	-2.88E+01*	-2.30E+01*
6	1.9487	2.4916	3.4172	5.3448	11.7886	-71.0500	-9.1328	-4.9675	-3.4558	-2.6773	-2.2047
	5131.7	4013.5	2926.4	1871.0	848.3	-140.7	-1095.0	-2013.1	-2893.7	-3735.1	-4535.8
	5.83E-02	6.96E-02	6.14E-02	4.57E-02	3.06E-02	1.91E-02	1.14E-02	6.60E-03	3.75E-03	2.10E-03	1.17E-03
	1.1565	1.1313	1.1093	1.0894	1.0712	1.0545	1.0391	1.0248	1.0114	.9987	.9866
	2.88E-01	2.92E-01	2.96E-01	2.99E-01	3.02E-01	3.04E-01	3.06E-01	3.08E-01	3.10E-01	3.11E-01	3.13E-01
	1.32E+03	7.78E+02	2.73E+02	5.43E+01	3.45E+00	-2.00E-02	-5.69E+00	-2.07E+01	-3.54E+01	-4.30E+01	-4.31E+01
	1.31E+03	7.77E+02	2.73E+02	5.45E+01	3.47E+00	-2.01E-02	-5.73E+00	-2.09E+01*	-3.57E+01*	-4.34E+01*	-4.36E+01*
7	1.5009	1.8036	2.2434	2.9394	4.2028	7.1926	22.9296	-20.7470	-7.3390	-4.5371	-3.3281
	6662.8	5544.6	4457.4	3402.1	2379.4	1390.3	436.1	-482.0	-1362.6	-2204.1	-3004.7
	3.69E-03	3.10E-02	5.42E-02	5.97E-02	5.22E-02	3.97E-02	2.76E-02	1.81E-02	1.14E-02	6.99E-03	4.20E-03
	1.2253	1.1702	1.1425	1.1197	1.0995	1.0812	1.0644	1.0490	1.0346	1.0211	1.0084
	2.74E-01	2.85E-01	2.90E-01	2.94E-01	2.98E-01	3.00E-01	3.03E-01	3.05E-01	3.07E-01	3.09E-01	3.10E-01
	1.66E+02	8.69E+02	8.19E+02	4.13E+02	1.26E+02	1.95E+01	4.26E-01	-7.66E-01	-1.10E+01	-2.89E+01	-4.44E+01
	1.59E+02*	8.60E+02	8.15E+02	4.12E+02	1.26E+02	1.96E+01	4.28E-01	-7.70E-01	-1.11E+01	-2.91E+01*	-4.48E+01*

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g$–$A\ ^3\Sigma_u^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.4468	.4774	.5117	.5505	.5947	.6454	.7042	.7730	.8548	.9532	1.0737
	22381.5	20948.6	19543.4	18165.9	16816.2	15494.6	14201.0	12935.8	11699.2	10491.5	9313.2
	1.00E-09	1.30E-06	2.33E-04	9.90E-03	1.12E-01	2.71E-01	2.01E-02	1.28E-01	4.74E-03	4.46E-02	7.74E-02
	2.0299	1.7952	1.6639	1.5736	1.5050	1.4515	1.4385	1.3499	1.2500	1.2902	1.2452
	8.27E-02	1.32E-01	1.65E-01	1.88E-01	2.06E-01	2.20E-01	2.24E-01	2.46E-01	2.69E-01	2.60E-01	2.70E-01
	(1.56E-04)	4.25E-01	9.59E+01	4.26E+03	4.58E+04	9.91E+04	5.82E+03	3.39E+04	1.11E+03	7.05E+03	9.22E+03
	1.06E-04*	4.03E-01*	9.51E+01*	4.27E+03*	4.60E+04	9.91E+04	5.71E+03	3.40E+04	1.16E+03*	6.97E+03	9.22E+03
9	.4192	.4460	.4758	.5092	.5468	.5894	.6380	.6940	.7592	.8358	.9272
	23854.0	22421.1	21015.8	19638.3	18288.7	16967.0	15673.4	14408.2	13171.6	11964.0	10785.6
	2.04E-13	8.27E-09	5.45E-06	6.34E-04	1.91E-02	1.55E-01	2.49E-01	1.90E-04	1.20E-01	2.93E-02	1.35E-02
	3.7747	2.0514	1.8078	1.6741	1.5834	1.5148	1.4629	1.8640	1.3630	1.2982	1.3170
	1.12E-04	7.88E-02	1.29E-01	1.62E-01	1.86E-01	2.04E-01	2.17E-01	1.16E-01	2.43E-01	2.58E-01	2.54E-01
	(7.06E-14)(	1.17E-03)	1.71E+00	2.56E+02	8.15E+03	6.38E+04	9.16E+04	(1.56E+01)	3.27E+04	6.77E+03	2.20E+03
	5.74E-07*	7.61E-04*	1.62E+00*	2.54E+02*	8.15E+03	6.40E+04	9.15E+04	1.02E+01*	3.26E+04	6.86E+03	2.15E+03
10	.3953	.4190	.4453	.4744	.5068	.5432	.5842	.6309	.6843	.7459	.8178
	25296.8	23864.0	22458.7	21081.2	19731.6	18409.9	17116.3	15851.1	14614.5	13406.8	12228.5
	5.36E-14	6.22E-14	3.77E-08	1.68E-05	1.43E-03	3.25E-02	1.98E-01	2.06E-01	1.02E-02	8.96E-02	5.92E-02
	1.5997	14.5540	2.0733	1.8205	1.6846	1.5934	1.5251	1.4753	1.3519	1.3774	1.3171
	1.81E-01	0.00E+00	7.50E-02	1.26E-01	1.60E-01	1.83E-01	2.01E-01	2.14E-01	2.45E-01	2.39E-01	2.54E-01
	(5.79E-08)(	0.00E+00)(	4.86E-03)	5.11E+00	5.67E+02	1.38E+04	8.11E+04	7.60E+04	3.90E+03	2.50E+04	1.41E+04
	4.86E-08*	1.31E-05*	2.96E-03*	4.81E+00*	5.61E+02*	1.38E+04	8.13E+04	7.59E+04	3.99E+03	2.48E+04	1.42E+04
11	.3744	.3956	.4189	.4446	.4729	.5045	.5397	.5792	.6239	.6748	.7330
	26710.0	25277.1	23871.9	22494.4	21144.7	19823.1	18529.5	17264.3	16027.7	14820.0	13641.7
	1.70E-15	3.22E-14	2.97E-13	1.26E-07	4.28E-05	2.84E-03	5.04E-02	2.34E-01	1.52E-01	3.88E-02	5.15E-02
	1.0771	2.8846	14.6460	2.0949	1.8336	1.6953	1.6037	1.5357	1.4895	1.3934	1.3953
	3.01E-01	6.46E-03	0.00E+00	7.13E-02	1.23E-01	1.57E-01	1.80E-01	1.98E-01	2.10E-01	2.35E-01	2.35E-01
	5.95E-09 (	4.39E-11)(	0.00E+00)(	1.48E-02)	1.25E+01	1.10E+03	2.11E+04	9.57E+04	5.59E+04	1.41E+04	1.46E+04
	5.75E-09*	4.35E-08*	6.01E-05*	8.36E-03*	1.17E+01*	1.09E+03*	2.12E+04	9.58E+04	5.58E+04	1.43E+04	1.44E+04
12	.3560	.3751	.3960	.4188	.4439	.4716	.5022	.5363	.5744	.6172	.6656
	28093.2	26660.3	25255.1	23877.6	22528.0	21206.3	19912.7	18647.5	17410.9	16203.2	15024.9
	4.85E-14	1.61E-14	1.99E-15	5.12E-14	3.44E-07	9.49E-05	5.10E-03	7.29E-02	2.60E-01	9.69E-02	7.25E-02
	1.2610	1.8337	-14.2460	-58.5080	2.1151	1.8470	1.7063	1.6143	1.5467	1.5069	1.4139
	2.66E-01	1.23E-01	0.00E+00	0.00E+00	6.80E-02	1.20E-01	1.54E-01	1.78E-01	1.95E-01	2.06E-01	2.30E-01
	1.55E-07 (	9.40E-09)(	0.00E+00)(	0.00E+00)(	3.69E-02)	2.65E+01	1.94E+03	3.02E+04	1.06E+05	3.54E+04	2.63E+04
	1.52E-07*	1.40E-08*	1.45E-06*	2.44E-04*	1.94E-02*	2.47E+01*	1.91E+03*	3.02E+04	1.06E+05	3.52E+04	2.64E+04
13	.3396	.3570	.3758	.3963	.4187	.4433	.4702	.5000	.5329	.5696	.6106
	29446.3	28013.4	26608.2	25230.7	23881.0	22559.3	21265.8	20000.6	18764.0	17556.3	16377.9
	2.38E-14	3.88E-14	7.27E-14	7.16E-13	1.17E-11	8.14E-07	1.90E-04	8.50E-03	9.94E-02	2.73E-01	5.03E-02
	1.2347	1.1724	.6158	-.5336	-5.3319	2.1350	1.8608	1.7175	1.6252	1.5583	1.5307
	2.72E-01	2.85E-01	3.13E-01	6.51E-02	6.49E-16	6.49E-02	1.17E-01	1.51E-01	1.75E-01	1.92E-01	2.00E-01
	9.12E-08	1.40E-07 (	2.72E-07)(	9.87E-08)(	1.36E-34)(	7.97E-02)	5.07E+01	3.15E+03	4.06E+04	1.11E+05	1.78E+04
	8.97E-08*	1.29E-07*	4.31E-07*	1.38E-05*	8.62E-04*	3.89E-02*	4.70E+01*	3.11E+03*	4.06E+04	1.11E+05	1.77E+04
14	.3250	.3409	.3580	.3766	.3968	.4187	.4427	.4690	.4978	.5297	.5650
	30768.9	29336.0	27930.7	26553.2	25203.6	23881.9	22588.4	21323.1	20086.5	18878.9	17700.5
	1.39E-15	1.03E-13	2.00E-13	1.44E-12	7.24E-12	8.94E-11	1.73E-06	3.49E-04	1.33E-02	1.29E-01	2.73E-01
	1.5158	1.2370	1.0240	.8833	.1627	-2.4150	2.1558	1.8749	1.7290	1.6365	1.5706
	2.03E-01	2.72E-01	3.08E-01	3.21E-01	2.24E-01	2.94E-05	6.17E-02	1.14E-01	1.48E-01	1.72E-01	1.89E-01
	(3.40E-09)	3.89E-07	8.41E-07 (	5.61E-06)(	1.18E-05)(	2.13E-12)(	1.53E-01)	8.93E+01	4.82E+03	5.20E+04	1.09E+05
	3.88E-09*	3.72E-07*	8.16E-07*	6.41E-06*	7.56E-05*	2.45E-03*	6.82E-02*	8.22E+01*	4.75E+03	5.20E+04	1.10E+05
15	.3119	.3265	.3422	.3591	.3774	.3972	.4188	.4422	.4678	.4958	.5265
	32060.7	30627.8	29222.6	27845.1	26495.4	25173.7	23880.2	22615.0	21378.4	20170.7	18992.4
	2.13E-14	1.90E-14	2.58E-13	1.53E-12	5.93E-12	3.04E-11	3.62E-10	3.37E-06	6.04E-04	1.99E-02	1.61E-01
	1.3336	1.0659	1.0815	1.0411	.8420	.3094	-1.4002	2.1759	1.8893	1.7408	1.6482
	2.50E-01	3.03E-01	3.00E-01	3.06E-01	3.22E-01	2.60E-01	4.14E-03	5.87E-02	1.11E-01	1.45E-01	1.69E-01
	8.85E-08	1.01E-07	1.18E-06	6.28E-06 (	2.32E-05)(	6.63E-05)(	1.71E-07)(	2.72E-01)	1.47E+02	7.00E+03	6.36E+04
	9.02E-08*	9.98E-08*	1.14E-06*	6.10E-06*	2.77E-05*	2.67E-04*	5.91E-03*	1.10E-01*	1.35E+02*	6.90E+03	6.36E+04

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g$–$A\ ^3\Sigma_u^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	1.2248	1.4192	1.6781	2.0392	2.5765	3.4576	5.1601	9.8056	71.8231	-14.2399	-6.6539
	8164.6	7046.4	5959.2	4903.9	3881.2	2892.1	1937.9	1019.8	139.2	-702.3	-1502.9
	3.35E-02	1.16E-03	9.35E-03	3.29E-02	4.89E-02	5.16E-02	4.52E-02	3.53E-02	2.55E-02	1.75E-02	1.16E-02
	1.2061	1.1146	1.1918	1.1554	1.1309	1.1101	1.0916	1.0747	1.0592	1.0447	1.0312
	2.78E-01	2.95E-01	2.81E-01	2.88E-01	2.92E-01	2.96E-01	2.99E-01	3.01E-01	3.04E-01	3.06E-01	3.07E-01
	2.86E+03	7.13E+01	3.16E+02	6.52E+02	4.95E+02	2.21E+02	5.95E+01	6.89E+00	1.29E-02	-2.30E+00	-1.51E+01
	2.89E+03	7.71E+01*	3.09E+02*	6.47E+02	4.93E+02	2.21E+02	5.96E+01	6.91E+00	1.29E-02	-2.31E+00	-1.52E+01
9	1.0377	1.1739	1.3456	1.5683	1.8679	2.2912	2.9322	4.0124	6.2048	12.9839	-328.5799
	9637.0	8518.9	7431.7	6376.3	5353.6	4364.6	3410.4	2492.3	1611.7	770.2	-30.4
	6.59E-02	5.32E-02	1.34E-02	1.73E-04	1.34E-02	3.22E-02	4.34E-02	4.49E-02	3.98E-02	3.20E-02	2.40E-02
	1.2585	1.2208	1.1803	1.3620	1.1728	1.1435	1.1214	1.1024	1.0853	1.0697	1.0552
	2.67E-01	2.75E-01	2.83E-01	2.43E-01	2.85E-01	2.90E-01	2.94E-01	2.97E-01	3.00E-01	3.02E-01	3.04E-01
	8.51E+03	5.04E+03	8.96E+02	(5.37E+00)	3.37E+02	4.56E+02	3.01E+02	1.24E+02	3.03E+01	2.70E+00	-2.54E-04
	8.47E+03	5.06E+03	9.13E+02	4.45E+00*	3.31E+02	4.53E+02	3.00E+02	1.24E+02	3.04E+01	2.71E+00	-2.55E-04
10	.9025	1.0038	1.1268	1.2789	1.4713	1.7219	2.0605	2.5412	3.2738	4.5186	7.0798
	11079.9	9961.7	8874.6	7819.2	6796.5	5807.5	4853.3	3935.2	3054.6	2213.1	1412.5
	2.18E-04	4.15E-02	5.98E-02	3.11E-02	4.23E-03	1.81E-03	1.52E-02	3.00E-02	3.84E-02	3.95E-02	3.57E-02
	1.5735	1.2741	1.2344	1.1998	1.1513	1.2152	1.1588	1.1337	1.1138	1.0963	1.0805
	1.88E-01	2.64E-01	2.72E-01	2.79E-01	2.89E-01	2.76E-01	2.87E-01	2.92E-01	2.95E-01	2.98E-01	3.01E-01
	(2.13E+01)	5.77E+03	6.27E+03	2.35E+03	2.24E+02	5.47E+01	2.92E+02	3.15E+02	1.93E+02	7.71E+01	1.84E+01
	1.69E+01*	5.71E+03	6.27E+03	2.38E+03	2.33E+02*	5.17E+01*	2.87E+02	3.13E+02	1.92E+02	7.70E+01	1.84E+01
11	.8004	.8791	.9720	1.0831	1.2181	1.3849	1.5958	1.8697	2.2383	2.7577	3.5390
	12493.1	11374.9	10287.7	9232.4	8209.7	7220.6	6266.4	5348.3	4467.7	3626.2	2825.6
	7.96E-02	6.40E-03	1.68E-02	5.13E-02	4.43E-02	1.67E-02	8.82E-04	3.50E-03	1.55E-02	2.72E-02	3.39E-02
	1.3320	1.2510	1.2971	1.2489	1.2151	1.1821	1.1076	1.1847	1.1477	1.1257	1.1076
	2.50E-01	2.69E-01	2.58E-01	2.69E-01	2.76E-01	2.83E-01	2.96E-01	2.82E-01	2.89E-01	2.93E-01	2.96E-01
	1.97E+04	1.38E+03	2.47E+03	5.92E+03	3.79E+03	1.02E+03	3.86E+01	8.64E+01	2.35E+02	2.26E+02	1.36E+02
	1.97E+04	1.43E+03*	2.42E+03	5.89E+03	3.80E+03	1.04E+03	4.19E+01*	8.31E+01*	2.31E+02	2.24E+02	1.36E+02
12	.7207	.7838	.8568	.9420	1.0424	1.1623	1.3072	1.4855	1.7091	1.9962	2.3759
	13876.3	12758.1	11671.0	10615.6	9592.9	8603.9	7649.7	6731.5	5851.0	5009.5	4208.9
	1.95E-02	8.29E-02	2.51E-02	2.03E-03	3.30E-02	4.67E-02	3.00E-02	8.63E-03	4.38E-05	4.53E-03	1.48E-02
	1.4236	1.3461	1.2885	1.3684	1.2660	1.2302	1.2002	1.1685	.9347	1.1662	1.1382
	2.27E-01	2.47E-01	2.60E-01	2.41E-01	2.65E-01	2.73E-01	2.79E-01	2.85E-01	3.17E-01	2.86E-01	2.91E-01
	5.45E+03	2.12E+04	5.48E+03	2.87E+02	4.15E+03	4.49E+03	2.12E+03	4.35E+02	(1.79E+00)	9.44E+01	1.90E+02
	5.34E+03	2.12E+04	5.56E+03	2.69E+02*	4.11E+03	4.49E+03	2.14E+03	4.45E+02*	2.59E+00*	9.13E+01*	1.87E+02
13	.6566	.7087	.7678	.8355	.9136	1.0043	1.1108	1.2369	1.3881	1.5717	1.7979
	15229.4	14111.2	13024.0	11968.6	10945.9	9956.9	9002.7	8084.6	7204.0	6362.5	5561.9
	9.99E-02	2.15E-03	6.96E-02	4.58E-02	1.54E-03	1.38E-02	3.77E-02	3.71E-02	1.96E-02	4.40E-03	5.90E-05
	1.4302	1.5231	1.3610	1.3077	1.1828	1.2915	1.2468	1.2167	1.1903	1.1616	1.2723
	2.26E-01	2.02E-01	2.43E-01	2.56E-01	2.83E-01	2.60E-01	2.70E-01	2.76E-01	2.81E-01	2.87E-01	2.64E-01
	3.64E+04	4.97E+02	1.84E+04	1.04E+04	3.28E+02	1.86E+03	4.05E+03	3.02E+03	1.18E+03	1.89E+02	(1.43E+00)
	3.65E+04	4.66E+02*	1.83E+04	1.05E+04	3.53E+02*	1.82E+03	4.03E+03	3.03E+03	1.19E+03	1.96E+02*	1.00E+00*
14	.6042	.6479	.6970	.7524	.8151	.8866	.9685	1.0630	1.1728	1.3012	1.4525
	16552.0	15433.8	14346.6	13291.2	12268.5	11279.5	10325.3	9407.2	8526.6	7685.1	6884.5
	1.76E-02	1.14E-01	1.96E-03	4.64E-02	5.90E-02	1.30E-02	1.82E-03	2.23E-02	3.47E-02	2.77E-02	1.28E-02
	1.5740	1.4455	1.2663	1.3782	1.3235	1.2643	1.3695	1.2679	1.2343	1.2088	1.1869
	1.88E-01	2.22E-01	2.65E-01	2.39E-01	2.52E-01	2.66E-01	2.41E-01	2.65E-01	2.72E-01	2.78E-01	2.82E-01
	5.72E+03	4.17E+04	8.26E+02	1.26E+04	1.40E+04	2.67E+03	2.36E+02	2.64E+03	3.23E+03	1.96E+03	6.74E+02
	5.68E+03	4.17E+04	8.82E+02*	1.24E+04	1.40E+04	2.72E+03	2.22E+02*	2.61E+03	3.23E+03	1.97E+03	6.85E+02
15	.5604	.5979	.6394	.6857	.7374	.7955	.8608	.9347	1.0185	1.1140	1.2230
	17843.8	16725.6	15638.4	14583.1	13560.4	12571.3	11617.1	10699.0	9818.4	8976.9	8176.3
	2.59E-01	1.67E-03	1.12E-01	1.57E-02	2.23E-02	5.97E-02	2.95E-02	1.11E-03	7.78E-03	2.44E-02	2.86E-02
	1.5837	1.7615	1.4611	1.3682	1.4015	1.3389	1.2896	1.1472	1.3044	1.2557	1.2283
	1.86E-01	1.40E-01	2.18E-01	2.41E-01	2.33E-01	2.48E-01	2.60E-01	2.89E-01	2.57E-01	2.68E-01	2.74E-01
	1.03E+05	3.12E+02	4.10E+04	5.75E+03	6.10E+03	1.48E+04	6.33E+03	2.30E+02	9.82E+02	2.56E+03	2.37E+03
	1.03E+05	3.00E+02*	4.10E+04	5.85E+03	5.99E+03	1.48E+04	6.38E+03	2.50E+02*	9.60E+02*	2.55E+03	2.38E+03

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g - A\ ^3\Sigma_u^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
16	.3001	.3136	.3280	.3436	.3603	.3783	.3978	.4188	.4417	.4666	.4938
	33321.5	31888.6	30483.4	29105.9	27756.2	26434.5	25141.0	23875.8	22639.2	21431.5	20253.1
	7.87E-15	3.69E-15	1.82E-13	9.07E-13	4.86E-12	1.89E-11	1.33E-10	1.10E-09	6.17E-06	9.92E-04	2.85E-02
	1.3359	1.9280	1.0855	1.0262	.9992	.7982	.5433	-.8678	2.1957	1.9038	1.7529
	2.49E-01	1.03E-01	3.00E-01	3.08E-01	3.11E-01	3.23E-01	3.04E-01	2.64E-02	5.59E-02	1.08E-01	1.42E-01
	3.66E-08	(2.55E-09)	9.38E-07	4.30E-06	2.04E-05	(7.36E-05)(	3.95E-04)(	2.12E-05)(	4.53E-01)	2.30E+02	9.74E+03
	3.75E-08*	4.19E-09*	9.17E-07*	4.23E-06*	2.01E-05*	9.30E-05*	8.84E-04*	1.27E-02*	1.65E-01*	2.09E+02*	9.59E+03
17	.2894	.3020	.3153	.3296	.3450	.3615	.3792	.3983	.4190	.4413	.4655
	34550.8	33117.9	31712.7	30335.2	28985.6	27663.9	26370.3	25105.1	23868.5	22660.8	21482.5
	2.81E-15	2.57E-15	5.85E-14	3.72E-13	2.66E-12	1.73E-11	5.59E-11	4.15E-10	2.57E-09	1.07E-05	1.56E-03
	1.2393	1.8350	1.0224	.9826	.9897	1.0157	.7801	.6605	-.6298	2.2150	1.9185
	2.71E-01	1.23E-01	3.09E-01	3.13E-01	3.12E-01	3.09E-01	3.22E-01	3.17E-01	5.12E-02	5.32E-02	1.05E-01
	1.72E-08	(2.86E-09)	3.60E-07	2.06E-06	1.28E-05	7.08E-05 (	2.16E-04)(	1.34E-03)(	1.86E-04)(	7.16E-01)(	3.44E+02)
	1.69E-08*	4.35E-09*	3.58E-07*	2.07E-06*	1.27E-05*	6.90E-05*	2.81E-04*	2.35E-03*	2.40E-02*	2.34E-01*	3.11E+02*
18	.2797	.2914	.3039	.3171	.3313	.3465	.3627	.3802	.3989	.4191	.4409
	35748.4	34315.5	32910.3	31532.8	30183.1	28861.4	27567.9	26302.7	25066.1	23858.4	22680.0
	2.15E-14	8.68E-15	3.34E-15	1.01E-13	1.21E-12	8.52E-12	3.91E-11	1.27E-10	1.09E-09	4.70E-09	1.79E-05
	1.2759	1.2126	.5808	.8938	.9714	.9964	.9679	.7334	.7539	-.5988	2.2337
	2.63E-01	2.77E-01	3.09E-01	3.20E-01	3.14E-01	3.12E-01	3.15E-01	3.21E-01	3.22E-01	5.55E-02	5.07E-02
	1.38E-07	5.45E-08 (	2.30E-08)	6.55E-07	6.67E-06	4.03E-05	1.64E-04 (	4.85E-04)(	3.59E-03)(	3.98E-04)(	1.09E+00)
	1.37E-07*	5.20E-08*	3.53E-08*	6.85E-07*	6.67E-06*	3.95E-05*	1.64E-04*	6.73E-04*	5.37E-03*	4.02E-02*	3.19E-01*
19	.2709	.2818	.2935	.3058	.3190	.3330	.3480	.3641	.3812	.3996	.4194
	36913.8	35480.9	34075.6	32698.1	31348.5	30026.8	28733.3	27468.0	26231.4	25023.8	23845.4
	1.58E-14	2.85E-14	2.32E-15	1.49E-14	4.32E-13	2.68E-12	1.81E-11	7.74E-11	2.45E-10	2.48E-09	6.94E-09
	1.2783	1.3289	1.6956	.6887	.9482	.9069	.9691	.9351	.6760	.8372	-.7560
	2.63E-01	2.51E-01	1.57E-01	3.19E-01	3.16E-01	3.19E-01	3.14E-01	3.17E-01	3.18E-01	3.22E-01	3.65E-02
	1.11E-07	1.62E-07 (	4.56E-09)(	1.08E-07)	2.70E-06	1.50E-05	8.59E-05	3.27E-04 (	9.09E-04)(	8.17E-03)(	2.54E-04)
	1.11E-07*	1.59E-07*	7.23E-09*	1.35E-07*	2.70E-06*	1.56E-05*	8.47E-05*	3.34E-04*	1.38E-03*	1.08E-02*	6.06E-02*
20	.2628	.2731	.2840	.2956	.3079	.3209	.3348	.3496	.3654	.3823	.4003
	38046.5	36613.6	35208.4	33830.9	32481.2	31159.6	29866.0	28600.8	27364.2	26156.5	24978.2
	4.34E-16	7.75E-15	4.45E-15	4.00E-16	8.14E-14	6.57E-13	5.59E-12	3.13E-11	1.28E-10	4.26E-10	5.19E-09
	1.2702	1.3785	1.3429	-.3399	.8656	.8393	.9208	.9430	.8916	.6251	.9261
	2.64E-01	2.39E-01	2.47E-01	1.00E-01	3.21E-01	3.22E-01	3.18E-01	3.17E-01	3.20E-01	3.14E-01	3.18E-01
	3.39E-09	4.39E-08	2.41E-08 (	3.15E-10)	5.84E-07	4.18E-06	3.06E-05	1.49E-04	5.43E-04 (	1.52E-03)(	1.66E-02)
	3.38E-09*	4.35E-08*	2.64E-08*	7.52E-09*	6.01E-07*	4.49E-06*	3.08E-05*	1.47E-04*	5.73E-04*	2.54E-03*	1.96E-02*
21	.2555	.2652	.2754	.2863	.2978	.3100	.3229	.3367	.3513	.3669	.3835
	39146.2	37713.3	36308.0	34930.5	33580.9	32259.2	30965.7	29700.4	28463.8	27256.2	26077.8
	7.68E-15	5.12E-15	1.38E-15	7.89E-16	9.58E-17	7.83E-14	7.45E-13	7.07E-12	4.30E-11	1.71E-10	6.13E-10
	1.2794	1.2644	1.1271	1.3948	5.4900	.8176	.7645	.8653	.9074	.8234	.5337
	2.62E-01	2.66E-01	2.93E-01	2.35E-01	8.15E-10	3.23E-01	3.22E-01	3.21E-01	3.19E-01	3.22E-01	3.03E-01
	6.43E-08	3.93E-08	1.15E-08 (	3.75E-09)(	4.88E-27)	5.54E-07	4.65E-06	3.88E-05	2.05E-04 (	7.31E-04)(	2.02E-03)
	6.42E-08*	3.91E-08*	1.23E-08*	5.38E-09*	4.02E-10*	5.37E-07*	5.14E-06*	3.95E-05*	2.03E-04*	8.22E-04*	4.02E-03*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 3. Radiative transition parameters for N_2 $B\ ^3\Pi_g$–$A\ ^3\Sigma_u^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
16	.5234	.5560	.5917	.6312	.6747	.7230	.7765	.8361	.9026	.9768	1.0596
	19104.6	17986.4	16899.2	15843.8	14821.1	13832.1	12877.9	11959.8	11079.2	10237.7	9437.1
	1.93E-01	2.33E-01	2.22E-03	9.54E-02	3.65E-02	5.30E-03	4.84E-02	4.28E-02	1.03E-02	3.50E-04	1.15E-02
	1.6604	1.5979	1.2989	1.4782	1.3988	1.4502	1.3550	1.3079	1.2495	1.5266	1.2878
	1.66E-01	1.82E-01	2.58E-01	2.13E-01	2.34E-01	2.21E-01	2.44E-01	2.56E-01	2.69E-01	2.01E-01	2.60E-01
	7.49E+04	9.08E+04	1.44E+03	3.49E+04	1.32E+04	1.38E+03	1.25E+04	9.70E+03	2.05E+03	3.06E+01	1.32E+03
	7.49E+04	9.11E+04	1.48E+03*	3.48E+04	1.33E+04	1.32E+03*	1.24E+04	9.72E+03	2.09E+03	2.80E+01*	1.31E+03
17	.4918	.5204	.5516	.5857	.6230	.6639	.7089	.7582	.8124	.8721	.9375
	20333.9	19215.7	18128.6	17073.2	16050.5	15061.5	14107.3	13189.1	12308.6	11467.1	10666.5
	3.94E-02	2.24E-01	1.98E-01	1.64E-02	6.99E-02	5.65E-02	3.73E-05	3.04E-02	4.71E-02	2.38E-02	2.52E-03
	1.7653	1.6731	1.6134	1.4512	1.4983	1.4201	.5731	1.3737	1.3246	1.2786	1.1778
	1.39E-01	1.62E-01	1.78E-01	2.20E-01	2.08E-01	2.28E-01	3.08E-01	2.40E-01	2.52E-01	2.63E-01	2.84E-01
	1.31E+04	8.51E+04	7.55E+04	8.01E+03	2.53E+04	2.04E+04	(2.01E+01)	8.12E+03	1.13E+04	5.01E+03	4.99E+02
	1.29E+04	8.52E+04	7.58E+04	8.00E+03	2.52E+04	2.05E+04	5.28E+01*	8.00E+03	1.12E+04	5.04E+03	5.21E+02*
18	.4644	.4899	.5174	.5473	.5798	.6150	.6534	.6951	.7404	.7896	.8429
	21531.5	20413.3	19326.1	18270.8	17248.1	16259.0	15304.8	14386.7	13506.1	12664.6	11864.0
	2.38E-03	5.29E-02	2.53E-01	1.57E-01	3.94E-02	4.19E-02	6.89E-02	6.43E-03	1.27E-02	4.09E-02	3.47E-02
	1.9332	1.7781	1.6863	1.6309	1.4939	1.5245	1.4395	1.3475	1.3995	1.3413	1.2990
	1.02E-01	1.36E-01	1.59E-01	1.73E-01	2.09E-01	2.01E-01	2.23E-01	2.46E-01	2.33E-01	2.48E-01	2.58E-01
	(4.96E+02)	1.70E+04	9.36E+04	5.82E+04	1.79E+04	1.48E+04	2.49E+04	2.36E+03	3.46E+03	1.03E+04	7.80E+03
	4.46E+02*	1.67E+04	9.38E+04	5.86E+04	1.79E+04	1.47E+04	2.50E+04	2.44E+03*	3.36E+03	1.02E+04	7.79E+03
19	.4406	.4634	.4880	.5145	.5431	.5739	.6072	.6430	.6816	.7231	.7675
	22696.9	21578.7	20491.5	19436.1	18413.4	17424.4	16470.2	15552.1	14671.5	13830.0	13029.4
	2.91E-05	3.52E-03	6.93E-02	2.77E-01	1.14E-01	6.56E-02	1.80E-02	7.01E-02	2.04E-02	1.82E-03	2.73E-02
	2.2510	1.9478	1.7912	1.7002	1.6514	1.5204	1.5669	1.4594	1.3910	1.4652	1.3593
	4.85E-02	9.86E-02	1.33E-01	1.56E-01	1.68E-01	2.02E-01	1.90E-01	2.18E-01	2.36E-01	2.17E-01	2.43E-01
	(1.62E+00)(	6.96E+02)	2.14E+04	9.96E+04	4.08E+04	2.88E+04	5.87E+03	2.54E+04	7.25E+03	4.57E+02	7.26E+03
	4.29E-01*	6.22E+02*	2.11E+04	1.00E+05	4.12E+04	2.86E+04	5.84E+03	2.54E+04	7.36E+03	4.20E+02*	7.13E+03
20	.4196	.4403	.4624	.4862	.5116	.5389	.5681	.5993	.6327	.6683	.7061
	23829.6	22711.4	21624.2	20568.9	19546.2	18557.1	17602.9	16684.8	15804.2	14962.7	14162.1
	7.50E-09	4.62E-05	5.09E-03	8.85E-02	2.95E-01	7.40E-02	8.91E-02	3.27E-03	6.02E-02	3.56E-02	7.94E-04
	-1.3019	2.2669	1.9625	1.8048	1.7149	1.6772	1.5420	1.6887	1.4820	1.4176	1.2792
	6.05E-03	4.65E-02	9.56E-02	1.30E-01	1.52E-01	1.61E-01	1.97E-01	1.58E-01	2.12E-01	2.29E-01	2.62E-01
	(7.53E-06)(	2.37E+00)(	9.53E+02)	2.64E+04	1.03E+05	2.50E+04	3.80E+04	7.72E+02	2.17E+04	1.27E+04	(3.14E+02)
	8.09E-02*	5.79E-01*	8.47E+02*	2.60E+04	1.03E+05	2.53E+04	3.79E+04	7.62E+02*	2.16E+04	1.28E+04	3.52E+02*
21	.4011	.4200	.4401	.4615	.4844	.5087	.5347	.5623	.5916	.6226	.6552
	24929.3	23811.1	22723.9	21668.5	20645.8	19656.8	18702.6	17784.5	16903.9	16062.4	15261.8
	9.58E-09	5.78E-09	7.19E-05	7.21E-03	1.11E-01	3.05E-01	4.04E-02	1.04E-01	4.50E-04	4.25E-02	4.58E-02
	1.0010	-2.5718	2.2823	1.9774	1.8191	1.7307	1.7140	1.5613	1.0296	1.5099	1.4420
	3.11E-01	1.16E-05	4.47E-02	9.26E-02	1.27E-01	1.48E-01	1.52E-01	1.91E-01	3.08E-01	2.05E-01	2.23E-01
	2.91E-02 (	2.13E-11)(	3.41E+00)(	1.28E+03)	3.17E+04	1.03E+05	1.24E+04	4.36E+04	(4.17E+02)	1.50E+04	1.64E+04
	3.16E-02*	9.80E-02*	7.73E-01*	1.13E+03*	3.12E+04	1.04E+05	1.27E+04	4.34E+04	4.79E+02*	1.49E+04	1.64E+04

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$.

v'\v"	0	1	2	3	4	5	6	7	8	9	10
0	136.1044	-6.1281	-3.0229	-2.0180	-1.5212	-1.2250	-1.0285	-.8886	-.7839	-.7028	-.6381
	73.5	-1631.8	-3308.1	-4955.4	-6573.7	-8163.0	-9723.2	-11254.3	-12756.1	-14228.5	-15671.4
	4.67E-01	3.88E-01	1.24E-01	1.95E-02	1.55E-03	5.70E-05	7.17E-07	2.83E-10	6.25E-11	1.79E-13	1.93E-14
	1.2504	1.2982	1.3528	1.4177	1.4990	1.6124	1.8164	3.5359	1.5555	2.6617	1.4711
	2.88E-01	2.73E-01	2.56E-01	2.33E-01	2.04E-01	1.65E-01	1.02E-01	1.45E-05	1.84E-01	3.82E-03	2.14E-01
	3.11E-02	-2.55E+02	-5.95E+02	-2.61E+02	-3.72E+01	-1.71E+00	(-1.38E-02)	(-1.71E-13)	(-8.94E-06)	(-1.52E-11)	(-6.92E-09)
	3.10E-02	-2.55E+02	-5.98E+02	-2.63E+02	-3.74E+01*	-1.67E+00*	-1.04E-02*	-2.05E-04*	-6.21E-06*	-6.83E-08*	-4.15E-09*
1	6.4311	-66.5097	-5.4745	-2.8786	-1.9638	-1.4967	-1.2133	-1.0232	-.8869	-.7845	-.7047
	1554.9	-150.4	-1826.6	-3473.9	-5092.2	-6681.5	-8241.7	-9772.8	-11274.6	-12747.0	-14189.9
	3.23E-01	2.73E-02	3.43E-01	2.42E-01	5.93E-02	6.36E-03	2.91E-04	4.09E-06	4.91E-10	5.99E-10	6.99E-13
	1.2089	1.2757	1.3083	1.3617	1.4265	1.5085	1.6243	1.8408	5.4968	1.6163	3.3927
	3.00E-01	2.80E-01	2.70E-01	2.53E-01	2.30E-01	2.01E-01	1.61E-01	9.53E-02	1.70E-14	1.63E-01	4.20E-05
	2.20E+02	-1.48E-02	-3.09E+02	-1.31E+03	-8.40E+02	-1.56E+02	-8.52E+00	(-7.03E-02)	(-4.11E-31)	(-6.72E-05)	(-7.15E-15)
	2.21E+02	-1.44E-02	-3.08E+02	-1.31E+03	-8.46E+02	-1.56E+02*	-8.33E+00*	-4.96E-02*	-1.92E-03*	-4.42E-05*	-1.11E-06*
2	3.3206	7.6556	-27.0233	-4.9570	-2.7506	-1.9139	-1.4738	-1.2025	-1.0185	-.8857	-.7853
	3011.5	1306.2	-370.1	-2017.3	-3635.6	-5224.9	-6785.1	-8316.2	-9818.0	-11290.5	-12733.4
	1.39E-01	2.11E-01	2.39E-02	1.92E-01	3.05E-01	1.12E-01	1.57E-02	8.60E-04	1.31E-05	2.13E-11	3.07E-09
	1.1727	1.2189	1.2372	1.3208	1.3711	1.4355	1.5182	1.6367	*.8683	-35.1380	1.6765
	3.09E-01	2.97E-01	2.92E-01	2.66E-01	2.49E-01	2.27E-01	1.98E-01	1.57E-01	8.83E-02	0.00E+00	1.44E-01
	7.36E+02	8.40E+01	-2.09E-01	-2.26E+02	-1.85E+03	-1.67E+03	-3.88E+02	-2.46E+01	(-1.97E-01)	(0.00E+00)	(-2.64E-04)
	7.39E+02	8.37E+01	-2.15E-01	-2.24E+02	-1.85E+03	-1.68E+03	-3.90E+02	-2.39E+01*	-1.26E-01*	-9.67E-03*	-1.59E-04*
3	2.2505	3.6522	9.4180	-17.0795	-4.5376	-2.6364	-1.8680	-1.4526	-1.1924	-1.0143	-.8848
	4443.4	2738.1	1061.8	-585.5	-2203.8	-3793.1	-5353.3	-6884.4	-8386.2	-9858.6	-11301.5
	4.91E-02	1.95E-01	6.89E-02	1.07E-01	6.86E-02	3.11E-01	1.69E-01	3.01E-02	1.93E-03	3.11E-05	9.53E-09
	1.1405	1.1809	1.2330	1.2590	1.3397	1.3812	1.4448	1.5281	1.6496	1.8995	-1.2926
	3.16E-01	3.07E-01	2.93E-01	2.85E-01	2.60E-01	2.46E-01	2.24E-01	1.94E-01	1.52E-01	8.08E-02	3.23E-04
	8.73E+02	7.62E+02	1.43E+01	-3.54E+00	-1.00E+02	-2.08E+03	-2.62E+03	-7.49E+02	-5.36E+01	(-3.94E-01)	(-2.91E-09)
	8.79E+02	7.63E+02	1.41E+01	-3.57E+00	-9.87E+01	-2.08E+03	-2.64E+03	-7.52E+02	-5.19E+01*	-2.19E-01*	-3.48E-02*
4	1.7092	2.4124	4.0502	12.1693	-12.5540	-4.1914	-2.5342	-1.8258	-1.4329	-1.1832	-1.0107
	5850.6	4145.3	2469.0	821.7	-796.6	-2385.8	-3946.1	-5477.1	-6978.9	-8451.4	-9894.3
	1.55E-02	1.07E-01	1.62E-01	4.31E-03	1.54E-01	8.57E-03	2.75E-01	2.21E-01	4.93E-02	3.65E-03	6.00E-05
	1.1115	1.1480	1.1899	1.2842	1.2708	1.3962	1.3922	1.4545	1.5383	1.6631	1.9357
	3.22E-01	3.15E-01	3.05E-01	2.78E-01	2.82E-01	2.41E-01	2.42E-01	2.20E-01	1.91E-01	1.48E-01	7.26E-02
	6.53E+02	1.52E+03	4.57E+02	3.74E-01	-1.26E+01	-1.37E+01	-2.01E+03	-3.56E+03	-1.23E+03	-9.75E+01	(-6.21E-01)
	6.60E+02	1.53E+03	4.55E+02	3.46E-01*	-1.26E+01	-1.29E+01*	-2.00E+03	-3.58E+03	-1.24E+03	-9.41E+01*	-2.74E-01*
5	1.3825	1.8090	2.5962	4.5362	17.0594	-9.9691	-3.9012	-2.4424	-1.7869	-1.4147	-1.1749
	7233.4	5528.1	3851.8	2204.5	586.2	-1003.1	-2563.3	-4094.4	-5596.2	-7068.6	-8511.5
	4.61E-03	4.60E-02	1.37E-01	9.29E-02	9.44E-03	1.49E-01	2.90E-03	2.17E-01	2.63E-01	7.27E-02	6.09E-03
	1.0850	1.1187	1.1559	1.2005	1.1959	1.2819	1.2027	1.4047	1.4645	1.5488	1.6775
	3.27E-01	3.21E-01	3.13E-01	3.02E-01	3.03E-01	2.78E-01	3.01E-01	2.38E-01	2.17E-01	1.87E-01	1.43E-01
	3.79E+02	1.62E+03	1.55E+03	1.84E+02	3.53E-01	-2.36E+01	-8.98E+00	-1.70E+03	-4.38E+03	-1.82E+03	-1.56E+02
	3.83E+02*	1.63E+03	1.55E+03	1.82E+02	3.72E-01*	-2.35E+01	-9.97E+00*	-1.69E+03	-4.40E+03	-1.82E+03	-1.50E+02*
6	1.1639	1.4521	1.9193	2.8067	5.1426	28.1484	-8.2991	-3.6549	-2.3597	-1.7512	-1.3980
	8591.7	6886.4	5210.1	3562.8	1944.5	355.3	-1205.0	-2736.0	-4237.8	-5710.3	-7153.2
	1.33E-03	1.74E-02	7.90E-02	1.31E-01	3.34E-02	4.59E-02	1.10E-01	2.91E-02	1.52E-01	2.92E-01	9.92E-02
	1.0607	1.0921	1.1260	1.1642	1.2162	1.2258	1.2940	1.2989	1.4195	1.4750	1.5596
	3.31E-01	3.26E-01	3.19E-01	3.11E-01	2.98E-01	2.95E-01	2.75E-01	2.73E-01	2.33E-01	2.13E-01	1.83E-01
	1.87E+02	1.22E+03	2.31E+03	1.16E+03	4.41E+01	3.63E-01	-2.94E+01	-9.01E+01	-1.27E+03	-5.00E+03	-2.46E+03
	1.90E+02*	1.24E+03	2.32E+03	1.16E+03	4.30E+01	3.69E-01	-2.91E+01	-9.25E+01	-1.26E+03	-5.02E+03	-2.47E+03
7	1.0075	1.2165	1.5281	2.0421	3.0501	5.9196	77.4629	-7.1328	-3.4438	-2.2851	-1.7185
	9925.8	8220.5	6544.2	4896.9	3278.6	1689.3	129.1	-1402.0	-2903.8	-4376.2	-5819.1
	3.78E-04	6.09E-03	3.73E-02	1.01E-01	9.83E-02	3.44E-03	8.13E-02	6.27E-02	6.56E-02	9.47E-02	3.08E-01
	1.0384	1.0677	1.0992	1.1337	1.1734	1.2656	1.2393	1.3090	1.3215	1.4384	1.4860
	3.35E-01	3.30E-01	3.25E-01	3.18E-01	3.09E-01	2.83E-01	2.91E-01	2.70E-01	2.66E-01	2.26E-01	2.09E-01
	8.38E+01	7.48E+02	2.23E+03	2.43E+03	6.68E+02	2.70E+00	3.00E-02	-2.55E+01	-2.30E+02	-8.21E+02	-5.38E+03
	8.53E+01*	7.58E+02*	2.25E+03	2.44E+03	6.64E+02	2.47E+00*	3.03E-02	-2.50E+01	-2.33E+02	-8.12E+02	-5.39E+03

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	-.5853	-.5415	-.5045	-.4730	-.4457	-.4220	-.4012	-.3828	-.3665	-.3519	-.3387
	-17084.6	-18467.8	-19820.8	-21143.4	-22435.3	-23696.1	-24925.4	-26123.0	-27288.3	-28421.1	-29520.7
	1.36E-16	2.82E-17	1.19E-17	1.30E-17	1.15E-16	1.98E-17	1.23E-16	4.55E-16	2.75E-16	2.71E-19	3.55E-16
	2.3841	1.3515	1.8307	1.1748	1.4071	1.7176	1.1610	1.2731	1.3329	-1.4147	1.2060
	1.41E-02	2.56E-01	9.80E-02	3.08E-01	2.37E-01	1.30E-01	3.12E-01	2.81E-01	2.62E-01	1.45E-04	3.00E-01
	(-2.74E-13)	(-2.36E-11)	(-1.80E-12)	(-2.37E-11)	-1.47E-10	(-9.09E-12)	-3.74E-10	-1.30E-09	-7.77E-10	(-2.66E-19)	-1.67E-09
	-1.42E-11*	-2.14E-11*	-1.46E-12*	-2.66E-11*	-1.57E-10*	-1.28E-11*	-3.77E-10*	-1.30E-09*	-7.91E-10*	-1.30E-11*	-1.66E-09*
1	-.6409	-.5887	-.5453	-.5086	-.4772	-.4502	-.4265	-.4058	-.3875	-.3712	-.3566
	-15603.1	-16986.3	-18339.4	-19662.0	-20953.8	-22214.6	-23443.9	-24641.5	-25806.9	-26939.6	-28039.3
	2.78E-13	4.33E-17	3.55E-15	7.72E-16	2.81E-16	1.89E-15	1.67E-15	2.88E-16	1.57E-16	1.18E-15	1.71E-15
	1.5623	7.2107	1.4228	1.3136	1.1617	1.2070	1.2128	1.2404	1.1221	1.1690	1.1817
	1.82E-01	2.87E-26	2.31E-01	2.68E-01	3.11E-01	3.00E-01	2.98E-01	2.91E-01	3.20E-01	3.10E-01	3.07E-01
	(-7.08E-08)	(0.00E+00)	-2.37E-09	-8.57E-10	-5.07E-10	-3.78E-09	-3.88E-09	-7.37E-10	-5.60E-10	-4.47E-09	-7.17E-09
	-3.97E-08*	-1.25E-09*	-2.33E-09*	-9.42E-10*	-4.65E-10*	-3.72E-09*	-3.88E-09*	-7.51E-10*	-5.57E-10*	-4.46E-09*	-7.13E-09*
2	-.7069	-.6439	-.5923	-.5493	-.5129	-.4817	-.4548	-.4313	-.4107	-.3924	-.3762
	-14146.5	-15529.7	-16882.8	-18205.4	-19497.2	-20758.0	-21987.3	-23184.9	-24350.3	-25483.0	-26582.7
	4.14E-13	1.52E-12	1.82E-15	8.53E-16	1.45E-15	4.43E-15	2.48E-15	1.70E-17	1.89E-15	4.77E-15	4.15E-15
	7.2072	1.6800	-.8581	2.3934	1.0616	1.2007	1.2332	1.7327	1.1577	1.1787	1.1715
	3.06E-26	1.42E-01	3.89E-03	1.36E-02	3.31E-01	3.02E-01	2.93E-01	1.26E-01	3.12E-01	3.07E-01	3.09E-01
	(0.00E+00)	(-2.33E-07)	(-2.69E-13)	(-1.92E-12)	-2.38E-09	-7.31E-09	-4.57E-09	(-6.82E-12)	-5.39E-09	-1.51E-08	-1.51E-08
	-8.76E-06*	-9.08E-08*	-1.57E-08*	-1.06E-10*	-2.30E-09*	-6.96E-09*	-4.48E-09*	-1.12E-11*	-5.32E-09*	-1.49E-08*	-1.48E-08*
3	-.7865	-.7093	-.6472	-.5962	-.5535	-.5174	-.4865	-.4597	-.4363	-.4158	-.3976
	-12714.7	-14097.9	-15450.9	-16773.5	-18065.4	-19326.1	-20555.5	-21753.1	-22918.4	-24051.2	-25150.8
	1.12E-08	1.95E-12	7.31E-12	1.28E-13	1.62E-15	1.79E-15	5.51E-17	1.53E-15	4.92E-15	6.49E-15	5.41E-15
	1.7371	-3.5191	1.7557	.8232	-.7847	.9097	1.2572	1.1105	1.1109	1.0994	1.0831
	1.25E-01	1.73E-13	1.19E-01	3.41E-01	5.61E-03	3.44E-01	2.86E-01	3.23E-01	3.23E-01	3.25E-01	3.28E-01
	(-7.21E-04)	(-3.33E-31)	(-7.74E-07)	(-1.42E-07)	(-6.12E-13)	(-3.10E-09)	(-7.93E-11)	-3.31E-09	-1.25E-08	-1.93E-08	-1.87E-08
	-3.78E-04*	-4.44E-05*	-2.10E-07*	-1.97E-07*	-1.92E-08*	-3.58E-09*	-2.82E-11*	-3.48E-09*	-1.25E-08*	-1.91E-08*	-1.85E-08*
4	-.8844	-.7880	-.7121	-.6508	-.6003	-.5581	-.5222	-.4915	-.4649	-.4416	-.4212
	-11307.4	-12690.7	-14043.7	-15366.3	-16658.1	-17918.9	-19148.3	-20345.8	-21511.2	-22643.9	-23743.6
	9.05E-08	3.18E-08	5.50E-11	2.59E-11	7.91E-13	8.98E-16	8.00E-15	9.78E-15	1.21E-14	1.37E-14	1.45E-14
	.2061	1.8022	-.0527	1.8454	1.0576	6.7755	1.5286	1.1170	1.0403	1.0218	1.0196
	1.71E-01	1.06E-01	9.23E-02	9.41E-02	3.32E-01	6.27E-23	1.94E-01	3.21E-01	3.34E-01	3.37E-01	3.37E-01
	(-7.76E-03)	(-1.47E-03)	(-2.63E-06)	(-1.68E-06)	(-8.16E-07)	(0.00E+00)	-4.28E-09	-1.72E-08	-2.72E-08	-3.66E-08	-4.46E-08
	-1.00E-01*	-5.99E-04*	-1.67E-04*	-1.65E-07*	-7.40E-07*	-2.91E-08*	-4.58E-09*	-1.88E-08*	-2.90E-08*	-3.78E-08*	-4.50E-08*
5	-1.0076	-.8843	-.7898	-.7151	-.6546	-.6047	-.5629	-.5273	-.4968	-.4703	-.4472
	-9924.7	-11307.9	-12661.0	-13983.6	-15275.4	-16536.2	-17765.5	-18963.1	-20128.5	-21261.2	-22360.9
	9.93E-05	4.43E-07	7.49E-08	4.51E-10	6.57E-11	3.15E-12	1.56E-14	6.48E-14	5.47E-14	5.83E-14	6.74E-14
	1.9786	.7464	1.8745	.7151	1.9845	1.2415	3.5411	1.4036	1.0737	1.0056	1.0046
	6.37E-02	3.32E-01	8.68E-02	3.27E-01	6.25E-02	2.90E-01	1.39E-05	2.38E-01	3.29E-01	3.38E-01	3.39E-01
	(-7.97E-01)	(-1.43E-01)	(-2.32E-03)	(-2.68E-04)	(-1.85E-06)	(-2.44E-06)	(-3.45E-17)	(-5.08E-08)	-9.80E-08	-1.30E-07	-1.75E-07
	-2.29E-01*	-2.43E-01*	-5.50E-04*	-5.16E-04*	-2.47E-07*	-1.74E-06*	-5.07E-08*	-4.45E-08*	-1.02E-07*	-1.39E-07*	-1.81E-07*
6	-1.1674	-1.0051	-.8848	-.7921	-.7185	-.6589	-.6095	-.5680	-.5328	-.5024	-.4761
	-8566.3	-9949.6	-11302.6	-12625.2	-13917.0	-15177.8	-16407.2	-17604.7	-18770.1	-19902.8	-21002.5
	9.29E-03	1.44E-04	1.55E-06	1.50E-07	2.30E-09	1.30E-10	1.16E-11	3.46E-14	3.40E-13	3.24E-13	3.39E-13
	1.6923	2.0310	1.0316	1.9584	1.0624	2.1819	1.4170	3.5677	1.3506	1.0726	1.0176
	1.38E-01	5.38E-02	3.35E-01	6.78E-02	3.31E-01	3.18E-02	2.33E-01	1.14E-05	2.56E-01	3.29E-01	3.37E-01
	-2.27E+02	(-8.35E-01)	-5.12E-01	(-2.81E-03)	-1.38E-03	(-9.25E-07)	(-5.67E-06)	(-4.93E-17)	(-2.99E-07)	-5.62E-07	-7.24E-07
	-2.16E+02*	-8.28E-02*	-5.17E-01*	-1.04E-04*	-1.35E-03*	-8.58E-06*	-3.38E-06*	-1.14E-07*	-2.41E-07*	-5.62E-07*	-7.53E-07*
7	-1.3827	-1.1607	-1.0032	-.8856	-.7947	-.7223	-.6634	-.6146	-.5735	-.5385	-.5084
	-7232.3	-8615.5	-9968.6	-11291.1	-12583.0	-13843.8	-15073.1	-16270.7	-17436.1	-18568.8	-19668.4
	1.28E-01	1.32E-02	1.86E-04	4.40E-06	2.56E-07	8.78E-09	1.83E-10	3.57E-11	7.44E-14	1.63E-12	1.60E-12
	1.5708	1.7081	2.0976	1.2131	2.0635	1.2702	2.5240	1.5880	3.1578	1.3087	1.0827
	1.79E-01	1.33E-01	4.30E-02	2.98E-01	4.83E-02	2.82E-01	7.51E-03	1.73E-01	2.12E-04	2.70E-01	3.28E-01
	-3.14E+03	-3.04E+02	(-6.91E-01)	(-1.14E+00)	(-2.41E-03)	(-3.75E-03)	(-7.18E-08)	(-9.34E-06)	(-3.59E-14)	(-1.54E-06)	-2.65E-06
	-3.14E+03	-2.88E+02	-8.19E-03*	-9.78E-01*	-5.67E-04*	-3.00E-03*	-6.42E-05*	-4.24E-06*	-1.20E-07*	-1.21E-06*	-2.55E-06*

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.8900	1.0493	1.2732	1.6112	2.1794	3.3343	6.9497	-108.4975	-6.2736	-3.2611	-2.2176
	11235.6	9530.3	7854.0	6206.7	4588.4	2999.1	1438.9	-92.2	-1594.0	-3066.4	-4509.3
	1.07E-04	2.04E-03	1.56E-02	5.92E-02	1.05E-01	5.73E-02	2.81E-03	9.88E-02	2.48E-02	9.74E-02	4.98E-02
	1.0177	1.0453	1.0747	1.1065	1.1416	1.1844	1.1449	1.2503	1.3328	1.3358	1.4658
	3.37E-01	3.34E-01	3.29E-01	3.23E-01	3.16E-01	3.06E-01	3.15E-01	2.88E-01	2.62E-01	2.61E-01	2.16E-01
	3.51E+01	3.99E+02	1.66E+03	3.00E+03	2.06E+03	2.93E+02	1.69E+00	-1.30E-02	-1.40E+01	-3.88E+02	-4.33E+02
	3.57E+01*	4.05E+02*	1.68E+03	3.02E+03	2.06E+03	2.89E+02	1.86E+00*	-1.30E-02	-1.35E+01	-3.91E+02	-4.26E+02
9	.7986	.9246	1.0941	1.3347	1.7024	2.3339	3.6704	8.3791	-32.4286	-5.6154	-3.1020
	12521.2	10815.9	9139.6	7492.3	5874.0	4284.7	2724.5	1193.4	-308.4	-1780.8	-3223.7
	3.07E-05	6.68E-04	6.10E-03	2.94E-02	7.66E-02	9.22E-02	2.31E-02	2.06E-02	9.57E-02	4.10E-03	1.17E-01
	.9986	1.0246	1.0523	1.0819	1.1140	1.1501	1.2001	1.1958	1.2610	1.4012	1.3478
	3.39E-01	3.36E-01	3.33E-01	3.28E-01	3.22E-01	3.14E-01	3.02E-01	3.03E-01	2.85E-01	2.39E-01	2.57E-01
	1.41E+01	1.94E+02	1.04E+03	2.70E+03	3.26E+03	1.45E+03	8.61E+01	6.52E+00	-4.61E-01	-2.68E+00	-5.25E+02
	1.43E+01*	1.97E+02*	1.06E+03*	2.72E+03	3.27E+03	1.45E+03	8.36E+01	6.73E+00	-4.59E-01	-2.44E+00*	-5.26E+02
10	.7255	.8280	.9614	1.1424	1.4014	1.8030	2.5088	4.0735	10.4922	-19.2549	-5.0962
	13782.6	12077.3	10401.1	8753.8	7135.5	5546.2	3986.0	2454.9	953.1	-519.3	-1962.2
	8.89E-06	2.16E-04	2.28E-03	1.32E-02	4.50E-02	8.45E-02	6.78E-02	3.79E-03	4.37E-02	7.76E-02	5.15E-04
	.9809	1.0054	1.0315	1.0593	1.0891	1.1217	1.1594	1.2400	1.2122	1.2725	1.0226
	3.41E-01	3.39E-01	3.35E-01	3.32E-01	3.27E-01	3.20E-01	3.12E-01	2.91E-01	2.99E-01	2.81E-01	3.37E-01
	5.48E+00	8.85E+01	5.84E+02	1.98E+03	3.54E+03	3.00E+03	8.47E+02	9.61E+00	6.84E+00	-1.74E+00	(-8.94E-01)
	5.60E+00*	9.02E+01*	5.94E+02*	2.00E+03	3.56E+03	3.00E+03	8.39E+02	8.86E+00*	6.95E+00	-1.73E+00	-1.23E+00*
11	.6658	.7511	.8592	1.0009	1.1943	1.4742	1.9145	2.7084	4.5654	13.9282	-13.7945
	15020.0	13314.7	11638.4	9991.1	8372.8	6783.5	5223.3	3692.2	2190.4	718.0	-724.9
	2.62E-06	7.00E-05	8.27E-04	5.60E-03	2.33E-02	5.89E-02	8.13E-02	4.06E-02	5.35E-04	6.20E-02	5.29E-02
	.9645	.9876	1.0122	1.0385	1.0664	1.0965	1.1298	1.1705	1.0506	1.2241	1.2857
	3.42E-01	3.40E-01	3.38E-01	3.35E-01	3.30E-01	3.25E-01	3.19E-01	3.09E-01	3.33E-01	2.95E-01	2.77E-01
	2.10E+00	3.87E+01	3.02E+02	1.27E+03	3.02E+03	3.94E+03	2.38E+03	3.97E+02	(1.26E+00)	4.06E+00	-3.14E+00
	2.15E+00*	3.95E+01*	3.07E+02*	1.28E+03*	3.05E+03	3.96E+03	2.38E+03	3.90E+02	1.59E+00*	4.09E+00	-3.08E+00
12	.6160	.6883	.7781	.8925	1.0432	1.2505	1.5536	2.0386	2.9381	5.1783	20.4814
	16233.1	14527.8	12851.6	11204.3	9586.0	7996.7	6436.5	4905.4	3403.6	1931.1	488.2
	7.83E-07	2.27E-05	2.96E-04	2.27E-03	1.11E-02	3.48E-02	6.76E-02	6.85E-02	1.79E-02	9.27E-03	7.03E-02
	.9490	.9709	.9943	1.0191	1.0455	1.0736	1.1041	1.1383	1.1857	1.1677	1.2347
	3.43E-01	3.41E-01	3.40E-01	3.37E-01	3.34E-01	3.29E-01	3.24E-01	3.17E-01	3.06E-01	3.10E-01	2.92E-01
	7.97E-01	1.65E+01	1.47E+02	7.34E+02	2.20E+03	3.91E+03	3.83E+03	1.64E+03	1.34E+02	1.30E+01	1.42E+00
	8.16E-01*	1.68E+01*	1.50E+02*	7.46E+02*	2.22E+03	3.95E+03	3.84E+03	1.63E+03	1.29E+02	1.37E+01*	1.42E+00
13	.5740	.6363	.7122	.8069	.9281	1.0886	1.3114	1.6408	2.1774	3.2050	5.9621
	17422.2	15716.8	14040.6	12393.3	10775.0	9185.7	7625.5	6094.4	4592.6	3120.2	1677.3
	2.38E-07	7.42E-06	1.06E-04	8.95E-04	4.97E-03	1.86E-02	4.59E-02	6.94E-02	5.01E-02	4.05E-03	2.38E-02
	.9342	.9552	.9775	1.0011	1.0261	1.0526	1.0810	1.1119	1.1477	1.2182	1.1890
	3.43E-01	3.42E-01	3.41E-01	3.39E-01	3.36E-01	3.33E-01	3.28E-01	3.22E-01	3.15E-01	2.97E-01	3.05E-01
	3.00E-01	6.85E+00	6.88E+01	3.97E+02	1.42E+03	3.23E+03	4.44E+03	3.30E+03	9.73E+02	2.20E+01	2.11E+01
	3.08E-01*	7.01E+00*	7.03E+01*	4.04E+02*	1.45E+03*	3.26E+03	4.47E+03	3.31E+03	9.62E+02	2.04E+01*	2.17E+01
14	.5380	.5924	.6577	.7376	.8375	.9661	1.1376	1.3776	1.7369	2.3337	3.5186
	18587.0	16881.7	15205.4	13558.1	11939.8	10350.5	8790.3	7259.2	5757.4	4285.0	2842.1
	7.30E-08	2.44E-06	3.75E-05	3.48E-04	2.15E-03	9.23E-03	2.74E-02	5.43E-02	6.38E-02	3.07E-02	1.37E-05
	.9193	.9401	.9616	.9842	1.0079	1.0331	1.0598	1.0884	1.1200	1.1586	.3696
	3.44E-01	3.43E-01	3.42E-01	3.40E-01	3.38E-01	3.35E-01	3.31E-01	3.27E-01	3.21E-01	3.12E-01	2.29E-01
	1.12E-01	2.80E+00	3.12E+01	2.04E+02	8.49E+02	2.33E+03	4.15E+03	4.49E+03	2.54E+03	4.77E+02	(3.34E-02)
	1.15E-01*	2.87E+00*	3.20E+01*	2.08E+02*	8.64E+02*	2.36E+03*	4.19E+03	4.51E+03	2.53E+03	4.68E+02	3.25E-01*
15	.5069	.5549	.6118	.6803	.7645	.8702	1.0070	1.1905	1.4497	1.8431	2.5109
	19727.5	18022.2	16345.9	14698.7	13080.4	11491.1	9930.9	8399.8	6898.0	5425.5	3982.6
	2.25E-08	8.07E-07	1.33E-05	1.34E-04	9.09E-04	4.37E-03	1.50E-02	3.64E-02	5.83E-02	5.26E-02	1.45E-02
	.9037	.9251	.9463	.9681	.9909	1.0149	1.0402	1.0671	1.0960	1.1285	1.1731
	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.40E-01	3.37E-01	3.34E-01	3.30E-01	3.25E-01	3.19E-01	3.09E-01
	4.14E-02	1.13E+00	1.39E+01	1.00E+02	4.76E+02	1.53E+03	3.34E+03	4.77E+03	4.10E+03	1.73E+03	1.77E+02
	4.26E-02*	1.16E+00*	1.42E+01*	1.03E+02*	4.85E+02*	1.55E+03*	3.38E+03	4.80E+03	4.11E+03	1.72E+03	1.71E+02

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	-1.6885	-1.3688	-1.1549	-1.0019	-.8871	-.7978	-.7266	-.6684	-.6201	-.5794	-.5447
	-5922.5	-7305.7	-8658.8	-9981.3	-11273.2	-12534.0	-13763.3	-14960.9	-16126.2	-17259.0	-18358.6
	3.12E-01	1.57E-01	1.76E-02	2.13E-04	1.07E-05	3.68E-07	2.74E-08	1.37E-10	8.94E-11	9.58E-14	5.88E-12
	1.4977	1.5824	1.7250	2.1871	1.3432	2.2075	1.4174	3.4454	1.7769	2.4432	1.2793
	2.05E-01	1.75E-01	1.28E-01	3.11E-02	2.59E-01	2.88E-02	2.33E-01	2.86E-05	1.13E-01	1.09E-02	2.79E-01
	-5.51E+03	-3.80E+03	-3.80E+02	(-4.17E-01)	(-2.07E+00)	(-1.22E-03)	(-7.89E-03)	(-7.59E-13)	(-9.67E-06)	(-1.18E-10)	(-5.75E-06)
	-5.53E+03	-3.80E+03	-3.57E+02	-4.83E-01*	-1.67E+00*	-7.90E-03*	-5.73E-03*	-3.01E-04*	-1.60E-06*	-7.38E-09*	-4.50E-06*
9	-2.1566	-1.6611	-1.3563	-1.1500	-1.0012	-.8890	-.8014	-.7312	-.6738	-.6260	-.5857
	-4636.9	-6020.1	-7373.1	-8695.7	-9987.6	-11248.3	-12477.7	-13675.3	-14840.6	-15973.4	-17073.0
	2.01E-02	3.06E-01	1.86E-01	2.23E-02	2.13E-04	2.28E-05	4.26E-07	7.29E-08	1.16E-12	1.84E-10	1.84E-15
	1.5147	1.5102	1.5944	1.7431	2.3165	1.4446	2.4332	1.5347	33.3270	2.0076	-7.5240
	1.99E-01	2.00E-01	1.71E-01	1.23E-01	1.88E-02	2.24E-01	1.14E-02	1.92E-01	0.00E+00	5.81E-02	1.40E-45
	-1.60E+02	-5.44E+03	-4.41E+03	-4.48E+02	(-1.51E-01)	(-3.30E+00)	(-2.17E-04)	(-1.39E-02)	(0.00E+00)	(-5.13E-06)	(0.00E+00)
	-1.56E+02	-5.46E+03	-4.42E+03	-4.17E+02	-2.42E+00*	-2.59E+00*	-3.85E-02*	-9.27E-03*	-1.07E-03*	-2.52E-06*	-4.28E-07*
10	-2.9626	-2.1014	-1.6362	-1.3451	-1.1460	-1.0013	-.8916	-.8056	-.7364	-.6797	-.6324
	-3375.4	-4758.6	-6111.7	-7434.3	-8726.1	-9986.9	-11216.2	-12413.8	-13579.2	-14711.9	-15811.6
	1.22E-01	4.35E-03	2.93E-01	2.14E-01	2.71E-02	1.78E-04	4.41E-05	3.52E-07	1.68E-07	6.43E-10	2.95E-10
	1.3590	1.6521	1.5236	1.6069	1.7627	2.5273	1.5295	2.8784	1.6382	-.3616	2.3409
	2.53E-01	1.51E-01	1.96E-01	1.67E-01	1.17E-01	7.40E-03	1.94E-01	1.18E-03	1.56E-01	3.42E-02	1.69E-02
	-6.12E+02	-2.18E+01	-5.20E+03	-4.95E+03	-4.99E+02	(-1.96E-02)	(-4.73E+00)	(-1.90E-06)	(-2.08E-02)	(-4.85E-06)	(-6.79E-07)
	-6.10E+02	-2.02E+01*	-5.22E+03	-4.96E+03	-4.58E+02	-7.27E+00*	-3.63E+00*	-1.28E-01*	-1.22E-02*	-3.07E-03*	-6.51E-05*
11	-4.6771	-2.8398	-2.0516	-1.6137	-1.3353	-1.1429	-1.0021	-.8947	-.8103	-.7421	-.6861
	-2138.1	-3521.3	-4874.4	-6196.9	-7488.8	-8749.6	-9978.9	-11176.5	-12341.8	-13474.6	-14574.2
	9.60E-03	1.16E-01	2.83E-06	2.76E-01	2.41E-01	3.16E-02	1.10E-04	7.76E-05	1.30E-07	3.38E-07	5.96E-09
	1.2505	1.3700	-8.1663	1.5380	1.6200	1.7841	2.9491	1.6050	4.3788	1.7389	.7487
	2.88E-01	2.50E-01	0.00E+00	1.91E-01	1.62E-01	1.11E-01	7.81E-04	1.67E-01	8.23E-09	1.24E-01	3.33E-01
	-1.58E+01	-6.37E+02	(0.00E+00)	-4.84E+03	-5.40E+03	(-5.26E+02)	(-1.35E-04)	(-6.15E+00)	(-3.35E-17)	(-2.57E-02)	(-4.14E-03)
	-1.66E+01*	-6.33E+02	-9.38E+00*	-4.87E+03	-5.41E+03	-4.75E+02	-1.70E+01*	-4.59E+00*	-3.37E-01*	-1.18E-02*	-7.40E-03*
12	-10.8118	-4.3325	-2.7314	-2.0065	-1.5935	-1.3269	-1.1408	-1.0037	-.8986	-.8156	-.7484
	-924.9	-2308.1	-3661.2	-4983.8	-6275.6	-7536.4	-8765.7	-9963.3	-11128.7	-12261.4	-13361.1
	2.92E-02	2.54E-02	1.01E-01	3.62E-03	2.57E-01	2.66E-01	3.55E-02	3.36E-05	1.25E-04	1.68E-08	5.89E-07
	1.3030	1.2844	1.3814	1.1526	1.5537	1.6336	1.8077	4.3055	1.6762	-8.0302	1.8477
	2.72E-01	2.78E-01	2.46E-01	3.14E-01	1.85E-01	1.58E-01	1.04E-01	1.71E-08	1.44E-01	0.00E+00	9.35E-02
	-3.46E+00	-4.87E+01	-6.04E+02	-8.92E+01	-4.42E+03	-5.74E+03	(-5.25E+02)	(-1.97E-14)	(-7.22E+00)	(0.00E+00)	(-2.49E-02)
	-3.36E+00	-5.01E+01	-5.98E+02	-9.84E+01*	-4.46E+03	-5.76E+03	-4.62E+02	-3.38E+01*	-5.13E+00*	-7.57E-01*	-5.91E-03*
13	37.8656	-8.9355	-4.0450	-2.6352	-1.9659	-1.5755	-1.3198	-1.1397	-1.0061	-.9031	-.8216
	264.1	-1119.1	-2472.2	-3794.8	-5086.6	-6347.4	-7576.7	-8774.3	-9939.7	-11072.4	-12172.1
	6.80E-02	1.16E-02	4.24E-02	8.14E-02	1.19E-02	2.39E-01	2.90E-01	3.83E-02	1.01E-06	1.86E-04	9.38E-07
	1.2452	1.3317	1.3023	1.3936	1.2779	1.5708	1.6479	1.8343	-15.1450	1.7477	.0993
	2.89E-01	2.63E-01	2.72E-01	2.42E-01	2.80E-01	1.79E-01	1.53E-01	9.70E-02	0.00E+00	1.21E-01	1.36E-01
	2.13E-01	-2.26E+00	-9.60E+01	-5.26E+02	-2.48E+02	-3.97E+03	-5.97E+03	(-4.93E+02)	(0.00E+00)	(-7.53E+00)	(-6.32E-02)
	2.12E-01	-2.15E+00	-9.75E+01	-5.19E+02	-2.54E+02	-4.02E+03	-6.01E+03	-4.19E+02	-6.01E+01*	-4.86E+00*	-1.49E+00*
14	6.9984	218.9094	-7.6490	-3.8024	-2.5499	-1.9295	-1.5596	-1.3141	-1.1396	-1.0093	-.9085
	1428.9	45.7	-1307.4	-2629.9	-3921.8	-5182.6	-6411.9	-7609.5	-8774.8	-9907.6	-11007.2
	3.82E-02	5.76E-02	2.01E-03	5.66E-02	6.15E-02	2.20E-02	2.22E-01	3.12E-01	3.97E-02	1.03E-04	2.52E-04
	1.2022	1.2562	1.4175	1.3154	1.4070	1.3215	1.5893	1.6629	1.8648	-.1021	1.8247
	3.01E-01	2.86E-01	2.33E-01	2.68E-01	2.37E-01	2.66E-01	1.73E-01	1.48E-01	8.92E-02	8.02E-02	9.96E-02
	2.05E+01	9.11E-04	(-4.94E-01)	-1.50E+02	-4.22E+02	-4.38E+02	-3.54E+03	-6.09E+03	(-4.32E+02)	(-1.30E+00)	(-6.74E+00)
	2.08E+01	9.02E-04	-4.33E-01*	-1.51E+02	-4.14E+02	-4.40E+02	-3.61E+03	-6.14E+03	-3.48E+02	-9.73E+01*	-3.56E+00*
15	3.8919	8.4300	-59.9535	-6.7142	-3.5955	-2.4740	-1.8970	-1.5459	-1.3099	-1.1406	-1.0135
	2569.5	1186.2	-166.8	-1489.4	-2781.2	-4042.0	-5271.4	-6468.9	-7634.3	-8767.0	-9866.7
	4.10E-03	4.83E-02	4.29E-02	1.86E-04	6.61E-02	4.33E-02	3.18E-02	2.09E-01	3.32E-01	3.92E-02	4.75E-04
	1.1402	1.2132	1.2684	.8542	1.3265	1.4223	1.3429	1.6095	1.6787	1.9008	.8300
	3.16E-01	2.98E-01	2.83E-01	3.43E-01	2.64E-01	2.32E-01	2.59E-01	1.66E-01	1.43E-01	8.05E-02	3.42E-01
	1.41E+01	1.46E+01	-3.22E-02	(-1.47E-01)	-2.01E+02	-3.11E+02	-6.33E+02	-3.15E+03	-6.10E+03	(-3.47E+02)	(-1.08E+02)
	1.52E+01*	1.47E+01	-3.16E-02	-2.74E-01*	-2.02E+02	-3.03E+02	-6.30E+02	-3.23E+03	-6.18E+03	-2.57E+02	-1.46E+02*

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
16	.4798	.5225	.5727	.6323	.7044	.7932	.9052	1.0509	1.2478	1.5286	1.9612
	20843.8	19138.5	17462.2	15814.9	14196.6	12607.3	11047.1	9516.0	8014.2	6541.8	5098.9
	6.87E-09	2.66E-07	4.72E-06	5.10E-05	3.77E-04	2.00E-03	7.76E-03	2.20E-02	4.39E-02	5.70E-02	3.84E-02
	.8856	.9094	.9311	.9526	.9747	.9977	1.0219	1.0473	1.0744	1.1039	1.1379
	3.44E-01	3.44E-01	3.44E-01	3.43E-01	3.41E-01	3.39E-01	3.37E-01	3.33E-01	3.29E-01	3.24E-01	3.17E-01
	1.49E-02	4.48E-01	6.01E+00	4.80E+01	2.54E+02	9.34E+02	2.40E+03	4.26E+03	4.96E+03	3.39E+03	1.03E+03
	1.54E-02*	4.60E-01*	6.16E+00*	4.91E+01*	2.60E+02*	9.51E+02*	2.44E+03*	4.31E+03	4.99E+03	3.39E+03	1.02E+03
17	.4559	.4943	.5390	.5915	.6541	.7300	.8238	.9427	1.0982	1.3100	1.6153
	21935.6	20230.3	18554.0	16906.7	15288.4	13699.2	12138.9	10607.9	9106.0	7633.6	6190.7
	2.03E-09	8.68E-08	1.66E-06	1.93E-05	1.54E-04	8.92E-04	3.84E-03	1.24E-02	2.92E-02	4.87E-02	5.10E-02
	.8628	.8917	.9153	.9373	.9591	.9815	1.0047	1.0290	1.0546	1.0819	1.1120
	3.43E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.41E-01	3.39E-01	3.36E-01	3.32E-01	3.28E-01	3.22E-01
	5.13E-03	1.72E-01	2.54E+00	2.23E+01	1.31E+02	5.39E+02	1.59E+03	3.37E+03	4.94E+03	4.72E+03	2.54E+03
	5.35E-03*	1.78E-01*	2.61E+00*	2.29E+01*	1.34E+02*	5.50E+02*	1.62E+03*	3.41E+03	4.98E+03	4.73E+03	2.53E+03
18	.4347	.4695	.5096	.5564	.6114	.6772	.7572	.8565	.9830	1.1493	1.3778
	23002.9	21297.6	19621.3	17974.1	16355.8	14766.5	13206.3	11675.2	10173.4	8700.9	7258.0
	5.63E-10	2.74E-08	5.76E-07	7.24E-06	6.23E-05	3.90E-04	1.84E-03	6.59E-03	1.79E-02	3.58E-02	4.98E-02
	.8298	.8698	.8978	.9214	.9436	.9657	.9883	1.0117	1.0361	1.0619	1.0896
	3.42E-01	3.44E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.40E-01	3.38E-01	3.35E-01	3.31E-01	3.27E-01
	1.62E-03	6.33E-02	1.04E+00	1.01E+01	6.49E+01	2.97E+02	9.92E+02	2.42E+03	4.28E+03	5.24E+03	4.11E+03
	1.72E-03*	6.59E-02*	1.08E+00*	1.03E+01*	6.65E+01*	3.04E+02*	1.01E+03*	2.46E+03*	4.33E+03	5.28E+03	4.12E+03
19	.4159	.4476	.4839	.5259	.5748	.6325	.7018	.7863	.8916	1.0263	1.2047
	24045.6	22340.3	20664.0	19016.8	17398.5	15809.2	14249.0	12717.9	11216.1	9743.6	8300.7
	1.36E-10	8.13E-09	1.93E-07	2.66E-06	2.48E-05	1.67E-04	8.57E-04	3.38E-03	1.03E-02	2.38E-02	4.07E-02
	.7738	.8392	.8765	.9040	.9277	.9502	.9725	.9952	1.0187	1.0433	1.0693
	3.36E-01	3.42E-01	3.44E-01	3.44E-01	3.44E-01	3.43E-01	3.41E-01	3.40E-01	3.37E-01	3.34E-01	3.30E-01
	(4.31E-04)	2.15E-02	4.08E-01	4.39E+00	3.12E+01	1.58E+02	5.86E+02	1.62E+03	3.34E+03	4.98E+03	5.13E+03
	4.81E-04*	2.27E-02*	4.24E-01*	4.53E+00*	3.20E+01*	1.61E+02*	5.98E+02*	1.65E+03*	3.39E+03	5.03E+03	5.16E+03
20	.3990	.4281	.4612	.4991	.5430	.5943	.6550	.7280	.8174	.9292	1.0731
	25063.6	23358.2	21682.0	20034.7	18416.4	16827.1	15266.9	13735.8	12234.0	10761.6	9318.7
	2.36E-11	2.13E-09	6.11E-08	9.47E-07	9.64E-06	7.06E-05	3.91E-04	1.68E-03	5.64E-03	1.48E-02	2.95E-02
	.6471	.7892	.8477	.8834	.9105	.9343	.9569	.9793	1.0022	1.0259	1.0506
	3.14E-01	3.38E-01	3.43E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.41E-01	3.39E-01	3.36E-01	3.33E-01
	(7.41E-05)	6.27E-03	1.48E-01	1.83E+00	1.44E+01	8.04E+01	3.30E+02	1.02E+03	2.40E+03	4.21E+03	5.36E+03
	9.84E-05*	6.90E-03*	1.56E-01*	1.89E+00*	1.49E+01*	8.25E+01*	3.38E+02*	1.04E+03*	2.44E+03*	4.27E+03	5.40E+03
21	.3838	.4107	.4410	.4756	.5152	.5612	.6150	.6789	.7560	.8507	.9698
	26056.6	24351.3	22675.0	21027.7	19409.4	17820.1	16259.9	14728.8	13227.0	11754.6	10311.7
	1.27E-12	4.23E-10	1.73E-08	3.19E-07	3.63E-06	2.91E-05	1.74E-04	8.12E-04	2.98E-03	8.66E-03	1.97E-02
	.0136	.6835	.8025	.8563	.8905	.9173	.9410	.9637	.9863	1.0094	1.0332
	1.10E-01	3.21E-01	3.39E-01	3.43E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.40E-01	3.38E-01	3.35E-01
	(5.54E-07)(	1.28E-03)	4.69E-02	7.07E-01	6.37E+00	3.94E+01	1.79E+02	6.15E+02	1.62E+03	3.26E+03	4.92E+03
	7.13E-06*	1.60E-03*	5.11E-02*	7.43E-01*	6.60E+00*	4.06E+01*	1.83E+02*	6.28E+02*	1.65E+03*	3.30E+03*	4.97E+03

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 4. Radiative transition parameters for N_2 $W\ ^3\Delta_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
16	2.7132	4.3431	10.5325	-26.7994	-6.0061	-3.4179	-2.4067	-1.8682	-1.5342	-1.3071	-1.1428
	3685.7	2302.5	949.4	-373.1	-1665.0	-2925.8	-4155.1	-5352.7	-6518.0	-7650.8	-8750.4
	4.06E-03	1.31E-02	5.23E-02	2.77E-02	4.27E-03	7.02E-02	2.83E-02	4.00E-02	2.00E-01	3.51E-01	3.67E-02
	1.2003	1.1690	1.2235	1.2831	1.2084	1.3367	1.4407	1.3539	1.6311	1.6953	1.9452
	3.02E-01	3.10E-01	2.96E-01	2.78E-01	3.00E-01	2.61E-01	2.25E-01	2.55E-01	1.58E-01	1.37E-01	7.06E-02
	3.76E+01	3.10E+01	7.92E+00	-2.25E-01	-3.58E+00	-2.43E+02	-2.08E+02	-8.09E+02	-2.81E+03	-6.01E+03	(-2.48E+02)
	3.49E+01*	3.22E+01	7.93E+00	-2.19E-01	-3.90E+00*	-2.42E+02	-2.01E+02	-7.99E+02	-2.91E+03	-6.11E+03	-1.56E+02
17	2.0931	2.9461	4.8989	13.9141	-17.4475	-5.4528	-3.2645	-2.3470	-1.8429	-1.5246	-1.3057
	4777.5	3394.3	2041.3	718.7	-573.1	-1833.9	-3063.3	-4260.8	-5426.2	-6559.0	-7658.6
	2.40E-02	7.61E-05	2.35E-02	5.02E-02	1.48E-02	1.18E-02	6.95E-02	1.68E-02	4.57E-02	1.95E-01	3.67E-01
	1.1485	1.4673	1.1842	1.2338	1.3033	1.2529	1.3464	1.4642	1.3577	1.6540	1.7130
	3.15E-01	2.16E-01	3.06E-01	2.93E-01	2.72E-01	2.87E-01	2.58E-01	2.17E-01	2.54E-01	1.51E-01	1.32E-01
	5.24E+02	(2.81E-01)	3.78E+01	3.23E+00	-4.17E-01	-1.22E+01	-2.69E+02	-1.24E+02	-9.53E+02	-2.54E+03	-5.82E+03
	5.12E+02	1.41E-01*	3.87E+01	3.22E+00	-4.00E-01	-1.27E+01	-2.68E+02	-1.18E+02	-9.35E+02	-2.65E+03	-5.93E+03
18	1.7109	2.2413	3.2169	5.5990	20.2357	-13.0447	-5.0101	-3.1313	-2.2942	-1.8210	-1.5172
	5844.9	4461.6	3108.6	1786.0	494.2	-766.6	-1996.0	-3193.5	-4358.9	-5491.6	-6591.3
	4.14E-02	1.20E-02	1.73E-03	3.23E-02	4.34E-02	5.78E-03	2.06E-02	6.52E-02	8.84E-03	4.84E-02	1.97E-01
	1.1205	1.1621	1.1120	1.1959	1.2445	1.3384	1.2740	1.3559	1.4964	1.3543	1.6780
	3.21E-01	3.11E-01	3.22E-01	3.03E-01	2.90E-01	2.60E-01	2.81E-01	2.54E-01	2.05E-01	2.55E-01	1.43E-01
	1.72E+03	2.09E+02	(1.09E+01)	3.42E+01	8.90E-01	-3.58E-01	-2.62E+01	-2.79E+02	-6.26E+01	-1.06E+03	-2.34E+03
	1.70E+03	2.01E+02	1.22E+01*	3.47E+01	8.82E-01	-3.34E-01*	-2.69E+01	-2.76E+02	-5.83E+01*	-1.03E+03	-2.47E+03
19	1.4519	1.8167	2.4089	3.5352	6.5067	36.2190	-10.4903	-4.6494	-3.0155	-2.2477	-1.8023
	6887.6	5504.3	4151.3	2828.7	1536.9	276.1	-953.3	-2150.8	-3316.2	-4448.9	-5548.6
	4.71E-02	3.01E-02	3.89E-03	7.22E-03	3.79E-02	3.41E-02	1.03E-03	2.89E-02	5.85E-02	3.81E-03	4.77E-02
	1.0974	1.1296	1.1851	1.1523	1.2063	1.2561	1.4453	1.2883	1.3656	1.5459	1.3404
	3.25E-01	3.19E-01	3.06E-01	3.14E-01	3.00E-01	2.86E-01	2.24E-01	2.76E-01	2.51E-01	1.88E-01	2.60E-01
	3.30E+03	1.03E+03	5.27E+01	3.26E+01	2.51E+01	1.19E-01	(-9.05E-02)	-4.44E+01	-2.73E+02	(-2.40E+01)	-1.11E+03
	3.29E+03	1.02E+03	4.90E+01*	3.43E+01*	2.53E+01	1.17E-01	-7.62E-02*	-4.52E+01	-2.70E+02	-2.12E+01*	-1.07E+03
20	1.2649	1.5332	1.9345	2.5997	3.9142	7.7278	154.6312	-8.8270	-4.3511	-2.9146	-2.2072
	7905.5	6522.3	5169.2	3846.6	2554.8	1294.0	64.7	-1132.9	-2298.3	-3431.0	-4530.7
	4.30E-02	4.12E-02	1.91E-02	2.74E-04	1.44E-02	3.95E-02	2.41E-02	6.86E-05	3.53E-02	5.08E-02	1.07E-03
	1.0769	1.1055	1.1399	1.2905	1.1697	1.2164	1.2694	.6154	1.2993	1.3761	1.6392
	3.29E-01	3.24E-01	3.16E-01	2.76E-01	3.10E-01	2.98E-01	2.82E-01	3.06E-01	2.73E-01	2.48E-01	1.56E-01
	4.65E+03	2.42E+03	5.34E+02	(2.40E+00)	4.66E+01	1.54E+01	1.05E-03	(-1.89E-02)	-6.48E+01	-2.55E+02	(-4.88E+00)
	4.66E+03	2.41E+03	5.21E+02	1.78E+00*	4.81E+01	1.54E+01	1.03E-03	-6.59E-02*	-6.55E+01	-2.51E+02	-3.46E+00*
21	1.1238	1.3306	1.6228	2.0663	2.8186	4.3725	9.4547	-71.4868	-7.6613	-4.1017	-2.8267
	8898.5	7515.3	6162.2	4839.6	3547.8	2287.0	1057.7	-139.9	-1305.3	-2438.0	-3537.7
	3.41E-02	4.24E-02	3.30E-02	9.88E-03	6.70E-04	2.13E-02	3.76E-02	1.51E-02	1.94E-03	3.95E-02	4.32E-02
	1.0580	1.0845	1.1139	1.1526	1.0807	1.1821	1.2264	1.2860	1.1643	1.3081	1.3889
	3.32E-01	3.27E-01	3.22E-01	3.14E-01	3.28E-01	3.07E-01	2.95E-01	2.77E-01	3.11E-01	2.70E-01	2.43E-01
	5.36E+03	3.91E+03	1.62E+03	2.23E+02	(6.53E+00)	4.86E+01	7.82E+00	-6.43E-03	(-8.46E-01)	-8.48E+01	-2.29E+02
	5.39E+03	3.91E+03	1.60E+03	2.14E+02*	7.79E+00*	4.96E+01	7.80E+00	-6.22E-03	-9.54E-01*	-8.53E+01	-2.25E+02

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$.

v'\v''	0	1	2	3	4	5	6	7	8	9	10
0	1.5280	2.0664	3.1616	6.5977	-97.4459	-5.9105	-3.0749	-2.0907	-1.5911	-1.2891	-1.0869
	6544.5	4839.2	3163.0	1515.7	-102.6	-1691.9	-3252.1	-4783.2	-6285.0	-7757.4	-9200.3
	4.81E-01	3.84E-01	1.17E-01	1.71E-02	1.22E-03	3.72E-05	2.83E-07	4.27E-10	6.55E-11	2.11E-14	3.16E-14
	1.2498	1.2983	1.3542	1.4215	1.5083	1.6375	1.9315	.4620	1.7599	-1.4747	1.6706
	1.75E-01	1.67E-01	1.56E-01	1.42E-01	1.24E-01	9.72E-02	4.69E-02	1.59E-01	7.39E-02	7.75E-05	9.06E-02
	1.68E+04	4.89E+03	3.65E+02	4.87E+00	-4.10E-05	-3.44E-03	(-4.35E-05)	(-2.40E-06)	(-1.80E-07)	(-1.20E-16)	(-4.10E-10)
	1.67E+04	4.90E+03	3.66E+02	4.92E+00	-4.13E-05*	-3.36E-03*	-1.96E-05*	-1.08E-05*	-1.01E-07*	-1.24E-08*	-2.16E-10*
1	1.2442	1.5793	2.1479	3.3241	7.1941	-50.1875	-5.6835	-3.0390	-2.0867	-1.5962	-1.2974
	8037.2	6331.9	4655.6	3008.3	1390.0	-199.3	-1759.5	-3290.5	-4792.4	-6264.8	-7707.7
	3.20E-01	3.57E-02	3.55E-01	2.32E-01	5.24E-02	5.00E-03	1.85E-04	1.46E-06	6.03E-09	5.38E-10	1.18E-12
	1.2074	1.2732	1.3083	1.3630	1.4303	1.5182	1.6516	1.9797	.8399	1.8265	.3426
	1.82E-01	1.71E-01	1.65E-01	1.54E-01	1.40E-01	1.22E-01	9.44E-02	4.07E-02	2.07E-01	6.26E-02	1.35E-01
	2.24E+04	1.08E+03	3.94E+03	6.08E+02	1.12E+01	-1.19E-03	-1.82E-02	(-1.75E-04)	(-5.77E-05)	(-1.05E-06)	(-1.99E-08)
	2.24E+04	1.05E+03	3.93E+03	6.11E+02	1.13E+01	-1.20E-03*	-1.76E-02*	-4.87E-05*	-8.85E-05*	-4.47E-07*	-1.53E-07*
2	1.0520	1.2820	1.6329	2.2337	3.4981	7.8778	-34.3849	-5.4888	-3.0087	-2.0850	-1.6028
	9505.8	7800.5	6124.3	4477.0	2858.7	1269.4	-290.8	-1821.9	-3323.7	-4796.2	-6239.0
	1.34E-01	2.21E-01	1.66E-02	2.14E-01	3.01E-01	1.00E-01	1.23E-02	5.34E-04	4.16E-06	4.05E-08	2.35E-09
	1.1706	1.2170	1.2285	1.3205	1.3724	1.4394	1.5284	1.6666	2.0398	1.0630	1.9018
	1.88E-01	1.81E-01	1.79E-01	1.62E-01	1.52E-01	1.38E-01	1.20E-01	9.14E-02	3.38E-02	2.01E-01	5.11E-02
	1.64E+04	1.39E+04	4.94E+02	2.05E+03	6.61E+02	1.59E+01	-8.79E-03	-5.47E-02	(-3.52E-04)	-3.64E-04	(-3.01E-06)
	1.65E+04	1.38E+04	5.12E+02	2.04E+03	6.63E+02	1.60E+01	-8.83E-03	-5.28E-02*	-2.50E-05*	-3.96E-04*	-6.82E-07*
3	.9132	1.0816	1.3212	1.6887	2.3237	3.6843	8.6653	-26.5222	-5.3224	-2.9839	-2.0859
	10950.7	9245.4	7569.1	5921.8	4303.5	2714.2	1154.0	-377.0	-1878.9	-3351.3	-4794.2
	4.57E-02	1.93E-01	8.12E-02	9.44E-02	8.94E-02	3.19E-01	1.53E-01	2.35E-02	1.17E-03	8.42E-06	1.82E-07
	1.1379	1.1784	1.2302	1.2555	1.3379	1.3823	1.4488	1.5388	1.6825	2.1182	1.2145
	1.92E-01	1.87E-01	1.79E-01	1.74E-01	1.59E-01	1.50E-01	1.37E-01	1.18E-01	8.83E-02	2.61E-02	1.81E-01
	8.99E+03	2.15E+04	4.55E+03	2.41E+03	7.30E+02	5.84E+02	1.78E+01	-3.53E-02	-1.22E-01	(-4.36E-04)	-1.33E-03
	9.06E+03	2.15E+04	4.49E+03	2.44E+03	7.19E+02	5.84E+02	1.79E+01	-3.54E-02	-1.17E-01*	-3.33E-05*	-1.27E-03*
4	.8083	.9375	1.1123	1.3618	1.7468	2.4181	3.8831	9.5765	-21.8531	-5.1812	-2.9648
	12372.0	10666.7	8990.4	7343.1	5724.8	4135.5	2575.3	1044.2	-457.6	-1930.0	-3372.9
	1.40E-02	1.01E-01	1.67E-01	9.15E-03	1.48E-01	1.91E-02	2.96E-01	2.04E-01	3.85E-02	2.14E-03	1.33E-05
	1.1085	1.1451	1.1870	1.2656	1.2675	1.3767	1.3931	1.4584	1.5496	1.6995	2.2268
	1.96E-01	1.91E-01	1.85E-01	1.73E-01	1.72E-01	1.51E-01	1.48E-01	1.34E-01	1.15E-01	8.50E-02	1.77E-02
	4.13E+03	1.82E+04	1.69E+04	4.37E+02	3.34E+03	1.25E+02	4.50E+02	1.70E+01	-9.94E-02	-2.25E-01	(-3.23E-04)
	4.17E+03	1.83E+04	1.69E+04	4.15E+02*	3.35E+03	1.21E+02	4.49E+02	1.71E+01	-9.97E-02	-2.14E-01*	-9.01E-04*
5	.7262	.8289	.9626	1.1440	1.4040	1.8072	2.5169	4.0949	10.6355	-18.7903	-5.0631
	13769.8	12064.5	10388.2	8740.9	7122.6	5533.4	3973.1	2442.1	940.2	-532.2	-1975.1
	4.06E-03	4.22E-02	1.34E-01	1.04E-01	4.21E-03	1.53E-01	1.62E-05	2.50E-01	2.48E-01	5.68E-02	3.45E-03
	1.0817	1.1154	1.1526	1.1969	1.1699	1.2782	-.6362	1.4051	1.4685	1.5608	1.7179
	1.99E-01	1.95E-01	1.90E-01	1.84E-01	1.88E-01	1.70E-01	7.65E-03	1.46E-01	1.32E-01	1.13E-01	8.16E-02
	1.70E+03	1.14E+04	2.20E+04	9.52E+03	2.18E+02	3.05E+03	(2.41E-04)	3.12E+02	1.47E+01	-2.21E-01	-3.59E-01
	1.72E+03*	1.15E+04	2.21E+04	9.43E+03	2.36E+02*	3.05E+03	1.76E+00*	3.11E+02	1.47E+01	-2.22E-01	-3.37E-01*
6	.6603	.7441	.8501	.9886	1.1769	1.4476	1.8699	2.6201	4.3199	11.8707	-16.6533
	15144.4	13439.1	11762.8	10115.5	8497.2	6908.0	5347.7	3816.7	2314.9	842.4	-600.5
	1.14E-03	1.55E-02	7.40E-02	1.33E-01	4.41E-02	3.43E-02	1.24E-01	1.46E-02	1.93E-01	2.84E-01	7.75E-02
	1.0571	1.0884	1.1224	1.1604	1.2105	1.2180	1.2894	1.2703	1.4189	1.4789	1.5723
	2.01E-01	1.98E-01	1.94E-01	1.89E-01	1.82E-01	1.81E-01	1.68E-01	1.72E-01	1.43E-01	1.30E-01	1.11E-01
	6.48E+02	5.97E+03	1.84E+04	2.00E+04	3.62E+03	1.49E+03	2.18E+03	9.72E+01	1.98E+02	1.16E+01	-4.15E-01
	6.58E+02*	6.03E+03	1.85E+04	1.99E+04	3.55E+03	1.53E+03	2.16E+03	1.02E+02	1.97E+02	1.17E+01	-4.16E-01
7	.6062	.6761	.7625	.8721	1.0154	1.2107	1.4927	1.9349	2.7275	4.5581	13.3152
	16495.9	14790.6	13114.3	11467.0	9848.7	8259.5	6699.2	5168.2	3666.4	2193.9	751.0
	3.16E-04	5.26E-03	3.37E-02	9.72E-02	1.06E-01	8.54E-03	6.95E-02	8.15E-02	4.45E-02	1.38E-01	3.09E-01
	1.0344	1.0637	1.0952	1.1296	1.1690	1.2407	1.2329	1.3025	1.3065	1.4355	1.4899
	2.03E-01	2.00E-01	1.97E-01	1.93E-01	1.88E-01	1.77E-01	1.78E-01	1.66E-01	1.65E-01	1.39E-01	1.28E-01
	2.36E+02	2.77E+03	1.20E+04	2.22E+04	1.45E+04	6.10E+02	2.69E+03	1.25E+03	2.42E+02	1.15E+02	8.67E+00
	2.40E+02*	2.81E+03*	1.21E+04	2.23E+04	1.44E+04	5.78E+02*	2.72E+03	1.24E+03	2.47E+02	1.13E+02	8.70E+00

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	-.9422	-.8336	-.7491	-.6816	-.6264	-.5806	-.5419	-.5089	-.4804	-.4556	-.4338
	-10613.5	-11996.7	-13349.8	-14672.4	-15964.2	-17225.0	-18454.3	-19651.9	-20817.3	-21950.0	-23049.7
	1.57E-16	4.06E-16	4.26E-16	1.35E-16	1.85E-18	1.80E-16	3.85E-16	2.81E-16	2.93E-17	8.80E-17	4.23E-16
	.6392	1.3247	1.1838	1.2125	.4912	1.1217	1.1830	1.2364	1.4039	1.1080	1.1938
	1.89E-01	1.62E-01	1.86E-01	1.82E-01	1.65E-01	1.94E-01	1.86E-01	1.78E-01	1.46E-01	1.96E-01	1.84E-01
	(-1.36E-11)	-3.71E-11	-7.09E-11	-2.85E-11	(-4.13E-13)	-7.02E-11	-1.70E-10	-1.36E-10	-1.14E-11	-7.23E-11	-3.57E-10
	-3.22E-11*	-3.45E-11*	-7.23E-11*	-2.93E-11*	-1.28E-12*	-7.16E-11*	-1.70E-10*	-1.36E-10*	-1.20E-11*	-7.43E-11*	-3.57E-10*
1	-1.0964	-.9520	-.8434	-.7587	-.6910	-.6356	-.5896	-.5507	-.5175	-.4888	-.4639
	-9120.9	-10504.1	-11857.1	-13179.7	-14471.6	-15732.3	-16961.7	-18159.2	-19324.6	-20457.4	-21557.0
	2.59E-13	5.62E-16	3.86E-15	9.24E-16	2.83E-16	2.34E-15	2.48E-15	6.07E-16	1.18E-16	1.47E-15	2.17E-15
	1.8395	.9122	1.4212	1.3088	1.1227	1.1911	1.2091	1.2376	1.1261	1.1916	1.2025
	6.05E-02	1.85E-01	1.42E-01	1.65E-01	1.94E-01	1.85E-01	1.82E-01	1.77E-01	1.94E-01	1.85E-01	1.83E-01
	(-1.46E-09)	(-4.53E-11)	-2.64E-10	-1.16E-10	-6.55E-11	-6.30E-10	-8.13E-10	-2.32E-10	-6.48E-11	-8.69E-10	-1.48E-09
	-2.67E-10*	-9.68E-11*	-2.47E-10*	-1.21E-10*	-6.27E-11*	-6.24E-10*	-8.10E-10*	-2.31E-10*	-6.56E-11*	-8.66E-10*	-1.47E-09*
2	-1.3068	-1.1068	-.9626	-.8539	-.7691	-.7011	-.6455	-.5991	-.5600	-.5266	-.4978
	-7652.2	-9035.4	-10388.5	-11711.1	-13002.9	-14263.7	-15493.0	-16690.6	-17856.0	-18988.7	-20088.4
	1.67E-11	1.15E-12	2.25E-14	4.26E-16	1.58E-15	5.14E-15	3.06E-15	1.59E-16	9.56E-16	3.19E-15	3.27E-15
	.8689	2.0223	1.1617	3.0134	1.0104	1.1914	1.2019	1.2372	1.1735	1.1830	1.1822
	2.08E-01	3.57E-02	1.89E-01	4.01E-04	2.05E-01	1.85E-01	1.83E-01	1.77E-01	1.87E-01	1.86E-01	1.86E-01
	(-6.55E-07)	(-2.20E-09)	(-1.83E-09)	(-2.22E-16)	-2.94E-10	-1.03E-09	-7.74E-10	-4.71E-11	-3.87E-10	-1.53E-09	-1.86E-09
	-9.80E-07*	-5.42E-10*	-1.44E-09*	-5.28E-11*	-3.23E-10*	-9.95E-10*	-7.58E-10*	-4.62E-11*	-3.87E-10*	-1.52E-09*	-1.84E-09*
3	-1.6110	-1.3174	-1.1181	-.9741	-.8652	-.7801	-.7118	-.6559	-.6093	-.5700	-.5364
	-6207.4	-7590.6	-8943.6	-10266.2	-11558.1	-12818.8	-14048.2	-15245.7	-16411.1	-17543.9	-18643.5
	7.05E-09	1.22E-10	4.20E-12	3.78E-13	6.92E-15	2.14E-15	5.72E-16	1.63E-16	1.74E-15	3.08E-15	2.89E-15
	1.9936	1.1292	2.1613	1.3305	.2516	.7327	1.0612	1.1581	1.1346	1.1285	1.1211
	3.90E-02	1.93E-01	2.24E-02	1.61E-01	1.16E-01	2.00E-01	2.01E-01	1.90E-01	1.93E-01	1.93E-01	1.94E-01
	(-5.20E-06)	-4.02E-06	(-3.07E-09)	(-2.13E-08)	(-2.89E-10)	(-3.66E-10)	(-1.29E-10)	(-4.21E-11)	-5.79E-10	-1.26E-09	-1.43E-09
	-6.04E-08*	-4.09E-06*	-1.51E-08*	-1.60E-08*	-3.16E-09*	-6.70E-10*	-1.15E-10*	-5.05E-11*	-5.90E-10*	-1.26E-09*	-1.41E-09*
4	-2.0894	-1.6209	-1.3294	-1.1306	-.9865	-.8774	-.7920	-.7234	-.6671	-.6202	-.5806
	-4786.1	-6169.3	-7522.4	-8845.0	-10136.8	-11397.6	-12626.9	-13824.5	-14989.9	-16122.6	-17222.3
	6.23E-07	1.58E-08	6.01E-10	9.90E-12	1.91E-12	1.48E-14	2.31E-15	2.68E-15	2.74E-15	3.15E-15	3.78E-15
	1.3276	2.1171	1.3002	2.4054	1.4546	.0149	2.2855	1.2908	1.0640	1.0125	1.0123
	1.61E-01	2.62E-02	1.66E-01	8.72E-03	1.35E-01	6.95E-02	1.42E-02	1.68E-01	2.00E-01	2.04E-01	2.04E-01
	(-3.59E-03)	(-5.16E-06)	(-1.43E-05)	(-1.05E-09)	(-7.39E-08)	(-2.15E-10)	(-1.89E-12)	-4.05E-10	(-7.52E-10)	-1.12E-09	-1.64E-09
	-3.22E-03*	-3.93E-06*	-1.26E-05*	-1.57E-07*	-4.96E-08*	-8.08E-09*	-1.23E-11*	-4.48E-10*	-8.37E-10*	-1.19E-09*	-1.68E-09*
5	-2.9514	-2.0958	-1.6328	-1.3428	-1.1443	-1.0000	-.8905	-.8047	-.7357	-.6791	-.6319
	-3388.3	-4771.5	-6124.5	-7447.1	-8738.9	-9999.7	-11229.1	-12426.6	-13592.0	-14724.7	-15824.4
	1.66E-05	1.76E-06	2.72E-08	2.34E-09	1.18E-11	6.72E-12	6.74E-14	1.74E-14	1.32E-14	1.05E-14	1.45E-14
	2.3913	1.4181	2.3000	1.4300	3.0719	1.5917	.4101	1.9827	1.2386	.9779	.9687
	9.25E-03	1.43E-01	1.34E-02	1.40E-01	2.82E-04	1.07E-01	1.49E-01	4.03E-02	1.77E-01	2.06E-01	2.07E-01
	(-1.12E-04)	(-7.90E-03)	(-2.27E-06)	(-3.85E-05)	(-1.26E-12)	(-1.54E-07)	(-4.28E-09)	(-1.10E-10)	-2.12E-09	(-2.90E-09)	-4.98E-09
	-5.22E-03*	-6.87E-03*	-4.99E-05*	-3.13E-05*	-1.10E-06*	-8.43E-08*	-2.20E-08*	-1.17E-11*	-2.05E-09*	-3.31E-09*	-5.42E-09*
6	-4.9661	-2.9439	-2.1053	-1.6468	-1.3579	-1.1594	-1.0148	-.9048	-.8185	-.7491	-.6921
	-2013.6	-3396.9	-4749.9	-6072.5	-7364.3	-8625.1	-9854.5	-11052.0	-12217.4	-13350.1	-14449.8
	5.06E-03	1.58E-05	4.25E-06	3.39E-08	7.43E-09	2.11E-12	2.01E-11	4.57E-13	5.99E-14	8.88E-14	9.05E-14
	1.7378	2.6785	1.4952	2.6195	1.5382	7.7851	1.7316	.9264	1.9274	1.2141	1.0253
	7.79E-02	2.48E-03	1.27E-01	3.32E-03	1.18E-01	3.13E-30	7.90E-02	2.08E-01	4.75E-02	1.81E-01	2.04E-01
	-5.08E-01	(-7.73E-06)	(-1.48E-02)	(-1.69E-07)	(-8.33E-05)	(0.00E+00)	(-2.43E-07)	(-5.40E-08)	(-4.99E-10)	(-1.41E-08)	-2.29E-08
	-4.70E-01*	-1.86E-02*	-1.26E-02*	-2.71E-04*	-6.28E-05*	-5.15E-06*	-8.40E-08*	-6.39E-08*	-4.67E-11*	-1.25E-08*	-2.40E-08*
7	-15.1024	-4.8891	-2.9426	-2.1182	-1.6631	-1.3748	-1.1761	-1.0309	-.9203	-.8334	-.7635
	-662.1	-2045.4	-3398.4	-4721.0	-6012.8	-7273.6	-8503.0	-9700.5	-10865.9	-11998.6	-13098.3
	9.98E-02	6.86E-03	9.78E-06	9.06E-06	2.48E-08	1.99E-08	2.92E-11	4.76E-11	2.04E-12	2.54E-13	5.30E-13
	1.5842	1.7597	3.3355	1.5643	3.4033	1.6374	-1.0751	1.9032	1.2600	1.7283	1.2087
	1.08E-01	7.39E-02	5.15E-05	1.12E-01	3.22E-05	9.72E-02	8.84E-04	5.09E-02	1.74E-01	7.96E-02	1.82E-01
	-6.86E-01	(-6.50E-0)	(-2.06E-09)	(-2.43E-02)	(-1.14E-11)	(-1.46E-04)	(-2.84E-11)	(-2.28E-07)	(-1.60E-07)	(-5.64E-09)	(-8.00E-08)
	-6.86E-01	-5.90E-01*	-5.10E-02*	-2.02E-02*	-1.01E-03*	-9.91E-05*	-1.84E-05*	-4.05E-09*	-1.23E-07*	-2.50E-09*	-6.85E-08*

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V''	0	1	2	3	4	5	6	7	8	9	10
8	.5610	.6204	.6924	.7815	.8947	1.0430	1.2457	1.5392	2.0021	2.8389	4.8087
	17824.4	16119.1	14442.9	12795.6	11177.3	9588.0	8027.8	6496.7	4994.9	3522.4	2079.5
	8.73E-05	1.71E-03	1.36E-02	5.44E-02	1.05E-01	6.80E-02	2.62E-04	9.24E-02	4.19E-02	7.55E-02	9.05E-02
	1.0135	1.0410	1.0704	1.1021	1.1371	1.1789	.9752	1.2438	1.3202	1.3237	1.4569
	2.04E-01	2.02E-01	2.00E-01	1.97E-01	1.92E-01	1.87E-01	2.06E-01	1.76E-01	1.6[illegible]-01	1.62E-01	1.35E-01
	8.37E+01	1.19E+03	6.65E+03	1.78E+04	2.19E+04	8.46E+03	(2.34E+01)	3.19E+03	5.59E+02	3.50E+02	5.99E+01
	8.52E+01*	1.21E+03*	6.73E+03	1.80E+04	2.20E+04	8.36E+03	3.37E+01*	3.21E+03	5.45E+02	3.55E+02	5.92E+01
9	.5227	.5739	.6350	.7092	.8011	.9180	1.0714	1.2817	1.5872	2.0712	2.9540
	19130.1	17424.8	15748.5	14101.2	12482.9	10893.6	9333.4	7802.4	6300.5	4828.1	3385.2
	2.43E-05	5.45E-04	5.16E-03	2.60E-02	7.21E-02	9.62E-02	3.30E-02	1.16E-02	9.76E-02	1.45E-02	9.96E-02
	.9942	1.0201	1.0477	1.0772	1.1092	1.1449	1.1919	1.1802	1.2538	1.3520	1.3361
	2.06E-01	2.04E-01	2.02E-01	1.99E-01	1.96E-01	1.91E-01	1.85E-01	1.86E-01	1.75E-01	1.56E-01	1.59E-01
	2.91E+01	4.86E+02	3.33E+03	1.17E+04	2.18E+04	1.85E+04	3.71E+03	7.75E+02	3.02E+03	1.62E+02	3.98E+02
	2.97E+01*	4.95E+02*	3.37E+03*	1.19E+04	2.19E+04	1.84E+04	3.63E+03	8.11E+02	3.01E+03	1.54E+02	4.00E+02
10	.4899	.5345	.5872	.6500	.7264	.8213	.9419	1.1007	1.3187	1.6364	2.1422
	20413.0	18707.7	17031.4	15384.1	13765.8	12176.5	10616.3	9085.3	7583.4	6111.0	4668.1
	6.87E-06	1.72E-04	1.87E-03	1.13E-02	4.05E-02	8.20E-02	7.59E-02	9.61E-03	3.17E-02	8.76E-02	1.58E-03
	.9765	1.0007	1.0267	1.0544	1.0840	1.1164	1.1534	1.2154	1.2017	1.2640	1.4789
	2.06E-01	2.05E-01	2.03E-01	2.01E-01	1.98E-01	1.95E-01	1.90E-01	1.81E-01	1.83E-01	1.73E-01	1.30E-01
	1.01E+01	1.92E+02	1.55E+03	6.76E+03	1.69E+04	2.28E+04	1.33E+04	9.57E+02	1.88E+03	2.42E+03	(1.10E+01)
	1.03E+01*	1.96E+02*	1.57E+03*	6.85E+03	1.70E+04	2.29E+04	1.32E+04	9.11E+02*	1.92E+03	2.40E+03	9.35E+00*
11	.4614	.5008	.5467	.6008	.6655	.7442	.8420	.9666	1.1308	1.3566	1.6868
	21673.2	19967.9	18291.6	16644.3	15026.0	13436.7	11876.5	10345.5	8843.6	7371.2	5928.3
	1.98E-06	5.42E-05	6.60E-04	4.62E-03	2.01E-02	5.41E-02	8.22E-02	5.08E-02	2.92E-04	5.11E-02	6.85E-02
	.9602	.9829	1.0073	1.0333	1.0611	1.0909	1.1238	1.1631	1.3905	1.2143	1.2749
	2.07E-01	2.06E-01	2.05E-01	2.03E-01	2.01E-01	1.98E-01	1.94E-01	1.89E-01	1.49E-01	1.81E-01	1.71E-01
	3.50E+00	7.42E+01	6.86E+02	3.56E+03	1.11E+04	2.08E+04	2.10E+04	8.13E+03	(1.81E+01)	2.72E+03	1.69E+03
	3.58E+00*	7.57E+01*	6.98E+02*	3.61E+03*	1.13E+04	2.09E+04	2.10E+04	8.03E+03	1.33E+01*	2.76E+03	1.67E+03
12	.4365	.4716	.5121	.5592	.6149	.6815	.7625	.8633	.9919	1.1616	1.3955
	22910.8	21205.4	19529.2	17881.9	16263.6	14674.3	13114.1	11583.0	10081.2	8608.8	7165.9
	5.82E-07	1.72E-05	2.30E-04	1.82E-03	9.22E-03	3.06E-02	6.40E-02	7.33E-02	2.75E-02	3.08E-03	6.40E-02
	.9453	.9664	.9893	1.0138	1.0400	1.0679	1.0980	1.1316	1.1752	1.1317	1.2245
	2.08E-01	2.07E-01	2.06E-01	2.04E-01	2.02E-01	2.00E-01	1.97E-01	1.93E-01	1.87E-01	1.93E-01	1.80E-01
	1.22E+00	2.84E+01	2.94E+02	1.76E+03	6.59E+03	1.57E+04	2.27E+04	1.72E+04	4.00E+03	2.96E+02	3.08E+03
	1.25E+00*	2.90E+01*	3.00E+02*	1.79E+03*	6.68E+03*	1.58E+04	2.28E+04	1.71E+04	3.90E+03	3.25E+02*	3.10E+03
13	.4145	.4460	.4821	.5236	.5721	.6294	.6979	.7814	.8853	1.0179	1.1932
	24125.7	22420.4	20744.1	19096.8	17478.5	15889.3	14329.1	12798.0	11296.2	9823.7	8380.8
	1.75E-07	5.52E-06	8.00E-05	6.98E-04	4.01E-03	1.57E-02	4.12E-02	6.81E-02	5.81E-02	1.04E-02	1.35E-02
	.9316	.9512	.9727	.9958	1.0204	1.0466	1.0747	1.1052	1.1400	1.1942	1.1719
	2.08E-01	2.07E-01	2.07E-01	2.05E-01	2.04E-01	2.02E-01	1.99E-01	1.96E-01	1.92E-01	1.84E-01	1.88E-01
	4.31E-01	1.08E+01	1.24E+02	8.31E+02	3.61E+03	1.04E+04	1.95E+04	2.23E+04	1.25E+04	1.36E+03	1.13E+03
	4.41E-01*	1.11E+01*	1.26E+02*	8.47E+02*	3.67E+03*	1.05E+04	1.97E+04	2.23E+04	1.24E+04	1.30E+03	1.18E+03
14	.3950	.4235	.4559	.4929	.5356	.5854	.6443	.7148	.8007	.9078	1.0446
	25318.1	23612.8	21936.5	20289.2	18670.9	17081.7	15521.4	13990.4	12488.6	11016.1	9573.2
	5.39E-08	1.80E-06	2.79E-05	2.65E-04	1.69E-03	7.53E-03	2.36E-02	5.00E-02	6.58E-02	4.03E-02	1.51E-03
	.9186	.9372	.9573	.9790	1.0023	1.0270	1.0533	1.0816	1.1126	1.1493	1.2519
	2.08E-01	2.08E-01	2.07E-01	2.06E-01	2.05E-01	2.03E-01	2.01E-01	1.99E-01	1.95E-01	1.91E-01	1.75E-01
	1.53E-01	4.14E+00	5.12E+01	3.81E+02	1.87E+03	6.29E+03	1.45E+04	2.19E+04	1.98E+04	7.95E+03	(1.64E+02)
	1.57E-01*	4.23E+00*	5.23E+01*	3.89E+02*	1.90E+03*	6.38E+03*	1.46E+04	2.21E+04	1.98E+04	7.83E+03	1.45E+02*
15	.3775	.4035	.4328	.4660	.5040	.5479	.5991	.6596	.7322	.8206	.9308
	26487.9	24782.6	23106.3	21459.1	19840.8	18251.5	16691.3	15160.2	13658.4	12185.9	10743.0
	1.69E-08	5.94E-07	9.80E-06	9.97E-05	6.94E-04	3.45E-03	1.24E-02	3.18E-02	5.55E-02	5.78E-02	2.36E-02
	.9060	.9239	.9429	.9634	.9854	1.0088	1.0337	1.0601	1.0886	1.1203	1.1606
	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.06E-01	2.05E-01	2.03E-01	2.01E-01	1.98E-01	1.94E-01	1.89E-01
	5.50E-02	1.58E+00	2.11E+01	1.71E+02	9.32E+02	3.56E+03	9.63E+03	1.81E+04	2.25E+04	1.60E+04	4.25E+03
	5.63E-02*	1.62E+00*	2.16E+01*	1.75E+02*	9.50E+02*	3.62E+03*	9.76E+03	1.83E+04	2.25E+04	1.59E+04	4.15E+03

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	15.0065	-13.9500	-4.8312	-2.9477	-2.1348	-1.6821	-1.3938	-1.1945	-1.0485	-.9372	-.8496
	666.4	-716.8	-2069.9	-3392.5	-4684.3	-5945.1	-7174.4	-8372.0	-9537.4	-10670.1	-11769.8
	3.25E-01	1.23E-01	8.69E-03	1.70E-06	1.73E-05	2.31E-09	4.54E-08	4.57E-10	8.22E-11	7.00E-12	7.52E-13
	1.5014	1.5966	1.7842	6.6440	1.6297	9.9711	1.7366	.6182	2.1699	1.5494	1.5562
	1.25E-01	1.05E-01	6.97E-02	1.81E-21	9.87E-02	0.00E+00	7.81E-02	1.86E-01	2.18E-02	1.15E-01	1.14E-01
	6.13E+00	-1.02E+00	(-7.57E-01)	(-4.40E-43)	(-3.51E-02)	(0.00E+00)	(-2.07E-04)	(-1.89E-05)	(-6.84E-08)	(-2.29E-07)	(-3.22E-08)
	6.15E+00	-1.02E+00	-6.70E-01*	-1.16E-01*	-2.81E-02*	-2.97E-03*	-1.13E-04*	-5.37E-05*	-4.43E-07*	-1.31E-07*	-1.92E-08*
9	5.0709	16.9831	-13.0852	-4.7920	-2.9598	-2.1554	-1.7039	-1.4152	-1.2148	-1.0679	-.9556
	1972.0	588.8	-764.2	-2086.8	-3378.6	-4639.4	-5868.8	-7066.3	-8231.7	-9364.5	-10464.1
	5.37E-02	3.34E-01	1.46E-01	1.04E-02	2.95E-06	2.97E-05	3.66E-08	8.85E-08	2.71E-09	8.71E-11	2.02E-11
	1.4865	1.5135	1.6096	1.8118	-2.8422	1.6948	-1.1831	1.8455	1.0805	2.7312	1.8300
	1.29E-01	1.23E-01	1.03E-01	6.50E-02	6.36E-10	8.59E-02	4.79E-04	5.95E-02	1.99E-01	1.90E-03	6.20E-02
	2.76E+01	4.17E+00	-1.40E+00	(-8.05E-01)	(-9.33E-20)	(-4.44E-02)	(-3.43E-09)	(-2.24E-04)	-1.21E-04	(-5.25E-10)	(-1.81E-07)
	2.71E+01	4.18E+00	-1.40E+00	-6.87E-01	-2.32E-01*	-3.35E-02*	-7.33E-03*	-7.14E-05*	-1.31E-04*	-5.05E-06*	-2.56E-08*
10	3.0723	5.3427	19.2800	-12.4391	-4.7715	-2.9793	-2.1806	-1.7291	-1.4391	-1.2374	-1.0892
	3254.9	1871.7	518.7	-803.9	-2095.8	-3356.5	-4585.9	-5783.5	-6948.8	-8081.6	-9181.2
	1.13E-01	2.79E-02	3.37E-01	1.68E-01	1.16E-02	3.76E-05	4.62E-05	3.78E-07	1.45E-07	1.08E-08	2.01E-11
	1.3466	1.5328	1.5263	1.6231	1.8439	.2172	1.7636	.5325	1.9803	1.3185	5.8073
	1.57E-01	1.19E-01	1.20E-01	1.00E-01	5.98E-02	1.08E-01	7.33E-02	1.72E-01	4.06E-02	1.63E-01	4.75E-16
	3.92E+02	1.05E+01	2.75E+00	-1.77E+00	(-7.76E-01)	(-3.38E-02)	(-4.85E-02)	(-4.40E-03)	(-1.62E-04)	(-3.05E-04)	(-7.09E-36)
	3.93E+02	1.02E+01	2.76E+00	-1.78E+00	-6.25E-01	-4.15E-01*	-3.28E-02*	-1.56E-02*	-1.39E-06*	-2.63E-04*	-2.60E-05*
11	2.2148	3.1929	5.6215	21.9162	-11.9680	-4.7702	-3.0069	-2.2108	-1.7579	-1.4660	-1.2625
	4515.1	3131.9	1778.9	456.3	-835.6	-2096.3	-3325.7	-4523.3	-5688.6	-6821.4	-7921.0
	1.10E-03	1.17E-01	1.18E-02	3.36E-01	1.89E-01	1.23E-02	1.46E-04	6.47E-05	1.64E-06	1.88E-07	3.31E-08
	1.0952	1.3562	1.6178	1.5399	1.6373	1.8822	.8577	1.8412	1.0191	2.1767	1.4822
	1.97E-01	1.56E-01	1.01E-01	1.17E-01	9.72E-02	5.39E-02	2.08E-01	6.02E-02	2.04E-01	2.12E-02	1.29E-01
	(1.60E+01)	3.51E+02	2.76E+00	1.78E+00	-2.12E+00	(-6.70E-01)	(-4.69E-01)	(-4.40E-02)	(-2.54E-02)	(-5.47E-05)	(-5.58E-04)
	1.99E+01*	3.50E+02	2.65E+00	1.79E+00	-2.12E+00	-4.90E-01	-6.74E-01*	-2.35E-02*	-2.91E-02*	-1.90E-04*	-4.29E-04*
12	1.7383	2.2886	3.3152	5.9037	24.8754	-11.6445	-4.7890	-3.0435	-2.2467	-1.7909	-1.4962
	5752.7	4369.5	3016.4	1693.8	402.0	-858.8	-2088.1	-3285.7	-4451.1	-5583.8	-6683.5
	4.66E-02	9.14E-03	1.12E-01	3.38E-03	3.34E-01	2.09E-01	1.22E-02	3.86E-04	8.01E-05	4.97E-06	1.70E-07
	1.2876	1.2417	1.3653	1.8278	1.5544	1.6522	1.9296	1.1450	1.9367	1.2655	2.5510
	1.69E-01	1.77E-01	1.54E-01	6.24E-02	1.14E-01	9.42E-02	4.72E-02	1.91E-01	4.62E-02	1.73E-01	4.58E-03
	1.02E+03	9.65E+01	2.93E+02	(2.59E-01)	1.15E+00	-2.38E+00	(-5.02E-01)	-1.02E+00	(-3.06E-02)	-5.23E-02	(-2.16E-06)
	1.00E+03	1.03E+02*	2.92E+02	1.96E-01*	1.16E+00	-2.38E+00	-3.07E-01	-1.01E+00*	-8.41E-03*	-4.76E-02*	-1.54E-03*
13	1.4352	1.7907	2.3633	3.4378	6.1844	28.0746	-11.4526	-4.8292	-3.0901	-2.2889	-1.8287
	6967.7	5584.4	4231.4	2908.8	1617.0	356.2	-873.2	-2070.7	-3236.1	-4368.8	-5468.5
	6.84E-02	2.69E-02	2.14E-02	1.01E-01	2.49E-04	3.32E-01	2.26E-01	1.12E-02	8.29E-04	8.50E-05	1.22E-05
	1.2340	1.3041	1.2747	1.3740	3.0467	1.5698	1.6680	1.9916	1.3151	2.0685	1.4272
	1.78E-01	1.66E-01	1.71E-01	1.52E-01	3.28E-04	1.11E-01	9.11E-02	3.92E-02	1.63E-01	3.08E-02	1.41E-01
	2.97E+03	5.19E+02	1.92E+02	2.33E+02	(4.60E-07)	7.50E-01	-2.53E+00	(-3.11E-01)	(-1.52E+00)	(-1.36E-02)	(-8.01E-02)
	2.97E+03	5.03E+02	1.99E+02	2.30E+02	1.78E-01*	7.58E-01	-2.53E+00	-1.25E-01	-1.38E+00*	-1.35E-04*	-6.79E-02*
14	1.2255	1.4756	1.8437	2.4383	3.5595	6.4575	31.3255	-11.3852	-4.8931	-3.1482	-2.3386
	8160.1	6776.8	5423.8	4101.2	2809.4	1548.6	319.2	-878.3	-2043.7	-3176.4	-4276.1
	2.66E-02	6.47E-02	1.21E-02	3.45E-02	8.73E-02	3.23E-04	3.33E-01	2.40E-01	9.26E-03	1.55E-03	7.13E-05
	1.1881	1.2433	1.3297	1.2922	1.3823	-.1219	1.5860	1.6848	2.0790	1.4332	2.2864
	1.85E-01	1.76E-01	1.61E-01	1.68E-01	1.50E-01	4.82E-02	1.08E-01	8.79E-02	2.97E-02	1.40E-01	1.41E-02
	2.01E+03	2.54E+03	2.03E+02	2.71E+02	1.77E+02	(1.13E-02)	5.08E-01	-2.55E+00	(-1.41E-01)	(-1.96E+00)	(-2.25E-03)
	2.06E+03	2.53E+03	1.92E+02	2.77E+02	1.75E+02	1.06E+00*	5.15E-01	-2.55E+00	-1.04E-02*	-1.75E+00*	-2.61E-02*
15	1.0718	1.2584	1.5166	1.8972	2.5131	3.6786	6.7157	34.3066	-11.4432	-4.9835	-3.2193
	9329.9	7946.7	6593.6	5271.0	3979.2	2718.4	1489.1	291.5	-873.9	-2006.6	-3106.3
	3.98E-04	3.85E-02	5.54E-02	3.37E-03	4.59E-02	7.26E-02	1.86E-03	3.36E-01	2.51E-01	6.54E-03	2.59E-03
	1.0182	1.1994	1.2530	1.3876	1.3046	1.3900	.7195	1.6030	1.7027	2.2181	1.5253
	2.04E-01	1.84E-01	1.75E-01	1.49E-01	1.65E-01	1.49E-01	1.99E-01	1.04E-01	8.44E-02	1.83E-02	1.20E-01
	(5.46E+01)	2.64E+03	1.97E+03	(4.45E+01)	3.21E+02	1.31E+02	(9.82E-01)	3.66E-01	-2.42E+00	-3.58E-02	(-2.28E+00)
	7.10E+01*	2.67E+03	1.95E+03	4.01E+01*	3.25E+02	1.28E+02	2.05E+00*	3.73E-01	-2.43E+00	-3.71E-02*	-2.02E+00*

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
16	.3619	.3857	.4123	.4424	.4765	.5155	.5606	.6132	.6754	.7500	.8410
	27635.2	25929.9	24253.6	22606.3	20988.0	19398.7	17838.5	16307.4	14805.6	13333.2	11890.3
	5.35E-09	1.99E-07	3.46E-06	3.76E-05	2.82E-04	1.54E-03	6.19E-03	1.84E-02	3.94E-02	5.67E-02	4.61E-02
	.8930	.9110	.9294	.9488	.9696	.9918	1.0154	1.0403	1.0669	1.0957	1.1285
	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.07E-01	2.06E-01	2.04E-01	2.02E-01	2.00E-01	1.97E-01	1.93E-01
	1.98E-02	6.08E-01	8.65E+00	7.57E+01	4.51E+02	1.92E+03	5.94E+03	1.33E+04	2.08E+04	2.12E+04	1.18E+04
	2.03E-02*	6.22E-01*	8.85E+00*	7.73E+01*	4.60E+02*	1.96E+03*	6.03E+03*	1.34E+04	2.09E+04	2.12E+04	1.16E+04
17	.3477	.3696	.3940	.4214	.4522	.4872	.5273	.5737	.6277	.6917	.7683
	28759.8	27054.5	25378.2	23730.9	22112.6	20523.4	18963.1	17432.1	15930.2	14457.8	13014.9
	1.70E-09	6.70E-08	1.23E-06	1.42E-05	1.14E-04	6.70E-04	2.97E-03	9.97E-03	2.50E-02	4.50E-02	5.35E-02
	.8786	.8979	.9162	.9350	.9548	.9759	.9983	1.0220	1.0470	1.0738	1.1030
	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.06E-01	2.05E-01	2.04E-01	2.02E-01	1.99E-01	1.96E-01
	7.08E-03	2.33E-01	3.54E+00	3.31E+01	2.14E+02	1.00E+03	3.46E+03	8.89E+03	1.67E+04	2.19E+04	1.84E+04
	7.28E-03*	2.39E-01*	3.62E+00*	3.39E+01*	2.18E+02*	1.02E+03*	3.52E+03*	9.01E+03*	1.68E+04	2.20E+04	1.84E+04
18	.3349	.3552	.3776	.4027	.4308	.4624	.4984	.5395	.5871	.6427	.7084
	29861.8	28156.5	26480.2	24832.9	23214.6	21625.3	20065.1	18534.0	17032.2	15559.8	14116.9
	5.34E-10	2.26E-08	4.40E-07	5.36E-06	4.56E-05	2.88E-04	1.39E-03	5.15E-03	1.46E-02	3.13E-02	4.78E-02
	.8613	.8837	.9028	.9215	.9408	.9610	.9823	1.0048	1.0286	1.0537	1.0807
	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.06E-01	2.05E-01	2.03E-01	2.01E-01	1.99E-01
	2.48E-03	8.83E-02	1.44E+00	1.44E+01	9.97E+01	5.06E+02	1.93E+03	5.58E+03	1.21E+04	1.94E+04	2.16E+04
	2.57E-03*	9.07E-02*	1.47E+00*	1.47E+01*	1.02E+02*	5.17E+02*	1.97E+03*	5.66E+03*	1.23E+04	1.95E+04	2.16E+04
19	.3232	.3420	.3629	.3859	.4116	.4404	.4729	.5099	.5521	.6010	.6581
	30941.0	29235.7	27559.4	25912.2	24293.9	22704.6	21144.4	19613.3	18111.5	16639.0	15196.1
	1.62E-10	7.50E-09	1.57E-07	2.02E-06	1.83E-05	1.23E-04	6.36E-04	2.57E-03	8.12E-03	1.99E-02	3.65E-02
	.8384	.8667	.8884	.9079	.9270	.9467	.9672	.9887	1.0113	1.0352	1.0605
	2.07E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.07E-01	2.06E-01	2.05E-01	2.03E-01	2.01E-01
	8.34E-04	3.28E-02	5.75E-01	6.17E+00	4.59E+01	2.51E+02	1.04E+03	3.33E+03	8.18E+03	1.53E+04	2.09E+04
	8.70E-04*	3.38E-02*	5.91E-01*	6.33E+00*	4.69E+01*	2.56E+02*	1.06E+03*	3.39E+03*	8.30E+03*	1.54E+04	2.11E+04
20	.3125	.3301	.3495	.3708	.3945	.4209	.4504	.4838	.5217	.5651	.6153
	31997.5	30292.2	28615.9	26968.6	25350.3	23761.0	22200.8	20669.7	19167.9	17695.5	16252.6
	4.58E-11	2.40E-09	5.48E-08	7.58E-07	7.27E-06	5.20E-05	2.87E-04	1.25E-03	4.33E-03	1.18E-02	2.51E-02
	.8041	.8443	.8716	.8935	.9133	.9328	.9527	.9735	.9952	1.0179	1.0419
	2.05E-01	2.07E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.07E-01	2.05E-01	2.04E-01	2.02E-01
	2.56E-04	1.16E-02	2.25E-01	2.61E+00	2.08E+01	1.22E+02	5.47E+02	1.91E+03	5.21E+03	1.11E+04	1.79E+04
	2.73E-04*	1.21E-02*	2.32E-01*	2.68E+00*	2.13E+01*	1.25E+02*	5.59E+02*	1.95E+03*	5.30E+03*	1.12E+04	1.81E+04
21	.3027	.3192	.3373	.3571	.3790	.4033	.4304	.4608	.4950	.5339	.5785
	33031.0	31325.7	29649.4	28002.1	26383.8	24794.6	23234.3	21703.3	20201.5	18729.0	17286.1
	1.10E-11	7.16E-10	1.86E-08	2.79E-07	2.87E-06	2.18E-05	1.28E-04	5.98E-04	2.23E-03	6.71E-03	1.60E-02
	.7424	.8108	.8499	.8769	.8988	.9189	.9387	.9589	.9799	1.0017	1.0245
	2.01E-01	2.06E-01	2.07E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.06E-01	2.05E-01	2.04E-01
	(6.52E-05)	3.78E-03	8.42E-02	1.07E+00	9.25E+00	5.82E+01	2.81E+02	1.06E+03	3.18E+03	7.51E+03	1.39E+04
	7.34E-05*	4.02E-03*	8.77E-02*	1.11E+00*	9.50E+00*	5.97E+01*	2.87E+02*	1.08E+03*	3.23E+03*	7.63E+03*	1.41E+04

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 5. Radiative transition parameters for N_2 $B'\ ^3\Sigma_u^- - B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
16	.9545	1.0996	1.2918	1.5581	1.9507	2.5869	3.7932	6.9506	36.5813	-11.6363	-5.1046
	10477.1	9093.9	7740.9	6418.3	5126.4	3865.7	2636.3	1438.7	273.4	-859.4	-1959.0
	1.06E-02	5.12E-03	4.65E-02	4.32E-02	9.67E-05	5.43E-02	5.85E-02	3.56E-03	3.44E-01	2.57E-01	3.48E-03
	1.1765	1.1400	1.2090	1.2634	1.9243	1.3147	1.3966	.8595	1.6208	1.7221	2.4940
	1.87E-01	1.92E-01	1.82E-01	1.73E-01	4.79E-02	1.64E-01	1.47E-01	2.08E-01	1.01E-01	8.08E-02	5.93E-03
	1.73E+03	5.75E+02	2.90E+03	1.39E+03	(1.21E-01)	3.40E+02	9.43E+01	(1.85E+00)	2.88E-01	-2.16E+00	(-1.87E-03)
	1.66E+03	6.14E+02*	2.92E+03	1.36E+03	5.46E-05*	3.43E+02	9.21E+01	2.83E+00*	2.95E-01	-2.17E+00	-2.71E-01*
17	.8619	.9786	1.1280	1.3258	1.5997	2.0039	2.6589	3.9011	7.1531	37.6997	-11.9846
	11601.7	10218.5	8865.5	7542.9	6251.1	4990.3	3760.9	2563.4	1398.0	265.3	-834.4
	3.29E-02	2.76E-03	1.31E-02	4.97E-02	3.06E-02	1.08E-03	5.94E-02	4.59E-02	4.59E-03	3.58E-01	2.58E-01
	1.1375	1.2100	1.1638	1.2179	1.2753	1.1015	1.3235	1.4014	.8609	1.6392	1.7433
	1.92E-01	1.82E-01	1.89E-01	1.81E-01	1.71E-01	1.97E-01	1.62E-01	1.46E-01	2.08E-01	9.68E-02	7.69E-02
	7.71E+03	3.94E+02	1.32E+03	2.82E+03	8.85E+02	(2.11E+01)	3.36E+02	6.71E+01	(2.19E+00)	2.54E-01	-1.80E+00
	7.59E+03	3.61E+02*	1.36E+03	2.83E+03	8.65E+02	2.58E+01*	3.38E+02	6.51E+01	3.29E+00*	2.61E-01	-1.80E+00
18	.7872	.8834	1.0033	1.1568	1.3600	1.6414	2.0564	2.7283	4.0001	7.3141	37.3734
	12703.7	11320.5	9967.5	8644.9	7353.0	6092.3	4862.9	3665.3	2500.0	1367.2	267.6
	4.66E-02	2.05E-02	1.89E-05	2.17E-02	4.85E-02	1.95E-02	4.82E-03	6.15E-02	3.51E-02	4.51E-03	3.79E-01
	1.1106	1.1479	1.8154	1.1773	1.2266	1.2898	1.2078	1.3316	1.4027	.7645	1.6581
	1.96E-01	1.91E-01	6.44E-02	1.87E-01	1.79E-01	1.68E-01	1.82E-01	1.60E-01	1.46E-01	2.03E-01	9.31E-02
	1.48E+04	4.39E+03	(3.14E-01)	1.99E+03	2.51E+03	5.06E+02	7.46E+01	3.15E+02	4.74E+01	(1.92E+00)	2.55E-01
	1.47E+04	4.29E+03	1.17E-03*	2.03E+03	2.50E+03	4.89E+02	8.09E+01*	3.16E+02	4.55E+01	3.45E+00*	2.64E-01
19	.7255	.8065	.9052	1.0284	1.1859	1.3944	1.6829	2.1077	2.7939	4.0875	7.4249
	13783.0	12399.7	11046.7	9724.1	8432.3	7171.5	5942.1	4744.6	3579.2	2446.5	1346.8
	4.75E-02	3.74E-02	1.04E-02	1.54E-03	2.92E-02	4.39E-02	1.08E-02	9.88E-03	6.12E-02	2.61E-02	3.23E-03
	1.0878	1.1186	1.1617	1.0975	1.1877	1.2353	1.3096	1.2408	1.3396	1.3973	.4922
	1.98E-01	1.95E-01	1.89E-01	1.97E-01	1.85E-01	1.78E-01	1.65E-01	1.77E-01	1.59E-01	1.47E-01	1.65E-01
	1.98E+04	1.10E+04	2.04E+03	(2.23E+02)	2.44E+03	2.07E+03	2.48E+02	1.34E+02	2.86E+02	3.36E+01	(8.69E-01)
	1.98E+04	1.08E+04	1.96E+03	2.51E+02*	2.48E+03	2.06E+03	2.36E+02	1.41E+02*	2.86E+02	3.18E+01	3.33E+00*
20	.6739	.7432	.8262	.9276	1.0539	1.2154	1.4289	1.7238	2.1572	2.8548	4.1610
	14839.4	13456.2	12103.2	10780.6	9488.7	8227.9	6998.6	5801.0	4635.7	3502.9	2403.3
	4.00E-02	4.40E-02	2.74E-02	3.70E-03	5.91E-03	3.43E-02	3.71E-02	4.82E-03	1.51E-02	5.92E-02	1.86E-02
	1.0674	1.0950	1.1272	1.1849	1.1398	1.1967	1.2443	1.3415	1.2580	1.3482	1.3772
	2.00E-01	1.97E-01	1.94E-01	1.86E-01	1.92E-01	1.84E-01	1.76E-01	1.58E-01	1.74E-01	1.57E-01	1.51E-01
	2.12E+04	1.69E+04	7.37E+03	6.48E+02	7.54E+02	2.62E+03	1.60E+03	9.57E+01	1.85E+02	2.54E+02	2.40E+01
	2.13E+04	1.69E+04	7.25E+03	6.04E+02*	7.98E+02*	2.65E+03	1.58E+03	8.86E+01*	1.92E+02	2.54E+02	2.24E+01
21	.6300	.6901	.7612	.8464	.9504	1.0797	1.2450	1.4632	1.7639	2.2044	2.9097
	15873.0	14489.7	13136.7	11814.1	10522.3	9261.5	8032.1	6834.6	5669.2	4536.5	3436.8
	2.98E-02	4.11E-02	3.82E-02	1.78E-02	4.38E-04	1.16E-02	3.66E-02	2.95E-02	1.40E-03	1.97E-02	5.65E-02
	1.0486	1.0743	1.1025	1.1370	1.2692	1.1573	1.2051	1.2539	1.4128	1.2681	1.3594
	2.02E-01	1.99E-01	1.96E-01	1.92E-01	1.72E-01	1.90E-01	1.83E-01	1.75E-01	1.44E-01	1.72E-01	1.55E-01
	1.97E+04	2.02E+04	1.35E+04	4.41E+03	(6.12E+01)	1.34E+03	2.57E+03	1.16E+03	(2.15E+01)	2.21E+02	2.23E+02
	1.98E+04	2.02E+04	1.34E+04	4.30E+03	4.93E+01*	1.39E+03	2.58E+03	1.14E+03	1.86E+01*	2.27E+02	2.22E+02

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.1450	.1501	.1555	.1612	.1672	.1736	.1805	.1878	.1956	.2040	.2130
	68951.3	66620.9	64319.3	62046.5	59802.4	57587.2	55400.7	53243.1	51114.4	49014.6	46943.9
	4.28E-02	1.51E-01	2.48E-01	2.50E-01	1.73E-01	8.77E-02	3.35E-02	9.88E-03	2.28E-03	4.12E-04	5.88E-05
	1.1578	1.1807	1.2043	1.2287	1.2541	1.2806	1.3083	1.3373	1.3680	1.4005	1.4351
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	9.83E+02	3.14E+03	4.63E+03	4.19E+03	2.60E+03	1.17E+03	3.99E+02	1.04E+02*	2.13E+01*	3.40E+00*	4.26E-01*
1	.1416	.1464	.1515	.1570	.1627	.1688	.1752	.1821	.1895	.1973	.2057
	70617.6	68287.2	65985.6	63712.8	61468.8	59253.5	57067.0	54909.4	52780.7	50681.0	48610.2
	1.15E-01	1.93E-01	8.09E-02	4.22E-04	8.85E-02	1.87E-01	1.76E-01	1.02E-01	4.14E-02	1.23E-02	2.75E-03
	1.1414	1.1633	1.1849	1.2447	1.2374	1.2618	1.2880	1.3155	1.3445	1.3751	1.4076
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.85E+03	4.31E+03	1.63E+03	7.65E+00*	1.44E+03	2.72E+03	2.28E+03	1.19E+03	4.27E+02	1.12E+02	2.21E+01*
2	.1384	.1430	.1479	.1530	.1585	.1642	.1703	.1768	.1838	.1911	.1990
	72256.1	69925.8	67624.2	65351.3	63107.3	60892.0	58705.6	56547.9	54419.2	52319.5	50248.8
	1.70E-01	9.74E-02	3.15E-03	1.08E-01	8.58E-02	6.97E-04	6.68E-02	1.67E-01	1.61E-01	9.23E-02	3.56E-02
	1.1258	1.1463	1.1809	1.1939	1.2157	1.2091	1.2709	1.2958	1.3230	1.3518	1.3824
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.50E+03	2.33E+03	6.83E+01*	2.10E+03	1.51E+03	1.10E+01*	9.47E+02	2.11E+03	1.82E+03	9.26E+02	3.16E+02
3	.1354	.1398	.1444	.1493	.1545	.1600	.1658	.1719	.1785	.1854	.1928
	73866.9	71536.5	69234.9	66962.1	64718.1	62502.8	60316.3	58158.7	56030.0	53930.2	51859.5
	1.83E-01	1.26E-02	7.50E-02	6.95E-02	3.72E-03	9.59E-02	6.48E-02	3.37E-04	8.24E-02	1.66E-01	1.42E-01
	1.1109	1.1278	1.1553	1.1750	1.2126	1.2247	1.2465	1.3311	1.3047	1.3308	1.3594
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	5.16E+03	3.22E+02	1.74E+03	1.46E+03	7.06E+01*	1.64E+03	9.96E+02	4.65E+00*	1.02E+03	1.83E+03	1.39E+03
4	.1325	.1368	.1412	.1459	.1508	.1560	.1616	.1674	.1736	.1801	.1871
	75449.9	73119.6	70818.0	68545.2	66301.1	64085.9	61899.4	59741.8	57613.1	55513.3	53442.6
	1.60E-01	6.01E-03	9.66E-02	6.19E-04	7.76E-02	3.69E-02	1.78E-02	9.74E-02	3.41E-02	1.12E-02	1.14E-01
	1.0966	1.1238	1.1387	1.1333	1.1843	1.2032	1.2370	1.2558	1.2768	1.3197	1.3393
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.82E+03	1.65E+02*	2.40E+03	1.40E+01*	1.58E+03	6.79E+02	2.96E+02	1.45E+03	4.57E+02	1.35E+02	1.22E+03
5	.1299	.1339	.1382	.1427	.1474	.1523	.1576	.1631	.1690	.1752	.1818
	77005.4	74675.1	72373.5	70100.6	67856.6	65641.3	63454.9	61297.2	59168.5	57068.8	54998.1
	1.22E-01	4.61E-02	4.72E-02	3.36E-02	5.67E-02	8.64E-03	7.89E-02	7.10E-03	4.92E-02	8.44E-02	6.09E-03
	1.0830	1.1053	1.1226	1.1485	1.1659	1.1985	1.2132	1.2262	1.2658	1.2873	1.3002
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	3.90E+03	1.34E+03	1.25E+03	8.10E+02	1.24E+03	1.71E+02*	1.41E+03	1.15E+02*	7.14E+02	1.10E+03	7.10E+01*
6	.1273	.1312	.1353	.1396	.1441	.1489	.1539	.1592	.1648	.1707	.1769
	78533.3	76203.0	73901.4	71628.6	69384.5	67169.2	64982.8	62825.2	60696.5	58596.7	56526.0
	8.34E-02	8.45E-02	4.80E-03	7.26E-02	2.81E-03	6.36E-02	1.43E-02	4.17E-02	5.36E-02	2.90E-03	8.13E-02
	1.0698	1.0909	1.1031	1.1317	1.1396	1.1754	1.1905	1.2234	1.2420	1.2904	1.2967
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.83E+03	2.62E+03	1.36E+02*	1.87E+03	6.58E+01*	1.35E+03	2.74E+02	7.25E+02	8.40E+02	4.09E+01*	1.03E+03
7	.1249	.1287	.1326	.1367	.1411	.1456	.1504	.1555	.1608	.1664	.1723
	80033.8	77703.5	75401.9	73129.1	70885.0	68669.7	66483.3	64325.7	62197.0	60097.2	58026.5
	5.28E-02	9.92E-02	5.47E-03	5.67E-02	1.71E-02	4.67E-02	1.33E-02	5.68E-02	1.47E-03	6.84E-02	1.31E-02
	1.0572	1.0776	1.1038	1.1165	1.1427	1.1578	1.1879	1.2027	1.2533	1.2519	1.2671
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.90E+03	3.26E+03	1.64E+02*	1.55E+03	4.26E+02	1.06E+03	2.73E+02	1.06E+03	2.48E+01*	1.04E+03	1.80E+02

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
0	.2227	.2332	.2445	.2567	.2701	.2846	.3006	.3181	.3375	.3590	.3830
	44902.3	42889.9	40906.7	38953.0	37028.9	35134.3	33269.6	31434.9	29630.3	27856.0	26112.1
	6.59E-06	5.75E-07	3.86E-08	1.95E-09	7.20E-11	1.85E-12	2.18E-14	3.24E-16	4.19E-16	2.46E-16	3.30E-17
	1.4724	1.5129	1.5575	1.6076	1.6641	1.7306	1.9218	1.8591	1.2575	1.2008	1.2536
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.18E-02*	3.18E-03*	1.85E-04*	8.06E-06*	2.56E-07*	5.63E-09*	5.62E-11*	7.06E-13*	7.64E-13*	3.72E-13*	4.12E-14*
1	.2147	.2244	.2349	.2462	.2584	.2717	.2862	.3021	.3195	.3387	.3600
	46568.6	44556.2	42573.1	40619.4	38695.2	36800.7	34936.0	33101.2	31296.6	29522.3	27778.5
	4.69E-04	6.14E-05	6.15E-06	4.66E-07	2.62E-08	1.06E-09	2.92E-11	5.03E-13	3.06E-15	7.35E-17	1.74E-17
	1.4423	1.4797	1.5203	1.5651	1.6155	1.6739	1.7440	1.8331	2.1335	1.6000	1.2260
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	3.32E+00*	3.81E-01*	3.32E-02*	2.19E-03*	1.06E-04*	3.69E-06*	8.73E-08*	1.28E-09*	6.57E-12*	1.32E-13*	2.61E-14*
2	.2074	.2165	.2262	.2366	.2479	.2602	.2734	.2879	.3036	.3209	.3399
	48207.1	46194.7	44211.6	42257.9	40333.7	38439.2	36574.5	34739.8	32935.1	31160.8	29417.0
	9.83E-03	2.00E-03	3.06E-04	3.50E-05	2.99E-06	1.86E-07	8.24E-09	2.45E-10	4.61E-12	4.03E-14	4.97E-16
	1.4149	1.4496	1.4871	1.5278	1.5729	1.6236	1.6828	1.7551	1.8384	2.0007	.8867
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.72E+01*	1.38E+01*	1.85E+00*	1.85E-01*	1.37E-02*	7.42E-04*	2.82E-05*	7.18E-07*	1.15E-08*	8.54E-11*	8.86E-13*
3	.2007	.2092	.2182	.2280	.2384	.2497	.2619	.2751	.2895	.3051	.3223
	49817.9	47805.5	45822.4	43868.7	41944.5	40050.0	38185.3	36350.5	34545.9	32771.6	31027.7
	7.25E-02	2.49E-02	6.07E-03	1.08E-03	1.41E-04	1.35E-05	9.32E-07	4.51E-08	1.43E-09	2.74E-11	2.80E-13
	1.3898	1.4223	1.4571	1.4946	1.5355	1.5808	1.6320	1.6916	1.7658	1.8618	1.9756
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	6.28E+02	1.91E+02	4.09E+01*	6.38E+00*	7.29E-01*	6.07E-02*	3.64E-03*	1.52E-04*	4.14E-06*	6.76E-08*	5.85E-10*
4	.1945	.2025	.2109	.2200	.2297	.2402	.2515	.2636	.2768	.2911	.3066
	51401.0	49388.6	47405.4	45451.7	43527.5	41633.0	39768.3	37933.6	36129.0	34354.7	32610.8
	1.64E-01	1.15E-01	4.97E-02	1.46E-02	3.01E-03	4.49E-04	4.82E-05	3.68E-06	1.93E-07	6.61E-09	1.29E-10
	1.3672	1.3975	1.4299	1.4647	1.5023	1.5434	1.5889	1.6405	1.7008	1.7759	1.8809
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.56E+03	9.71E+02	3.71E+02	9.58E+01	1.74E+01*	2.27E+00*	2.12E-01*	1.41E-02*	6.39E-04*	1.88E-05*	3.14E-07*
5	.1888	.1963	.2042	.2127	.2218	.2315	.2420	.2532	.2654	.2785	.2927
	52956.4	50944.0	48960.9	47007.2	45083.0	43188.5	41323.8	39489.1	37684.4	35910.1	34166.3
	4.48E-02	1.46E-01	1.49E-01	8.26E-02	2.93E-02	7.08E-03	1.20E-03	1.44E-04	1.21E-05	6.93E-07	2.52E-08
	1.3497	1.3755	1.4054	1.4377	1.4725	1.5101	1.5514	1.5972	1.6492	1.7105	1.7871
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.66E+02	1.35E+03	1.22E+03	6.01E+02	1.88E+02	3.99E+01*	5.94E+00*	6.22E-01*	4.55E-02*	2.25E-03*	7.05E-05*
6	.1835	.1906	.1981	.2060	.2145	.2236	.2334	.2438	.2550	.2671	.2802
	54484.4	52471.9	50488.8	48535.1	46610.9	44716.4	42851.7	41017.0	39212.4	37438.0	35694.2
	4.77E-02	3.37E-03	9.6-E-02	1.60E-01	1.18E-01	5.10E-02	1.45E-02	2.80E-03	3.77E-04	3.49E-05	2.15E-06
	1.3186	1.3761	1.3846	1.4135	1.4456	1.4804	1.5181	1.5595	1.6056	1.6582	1.7204
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	5.40E+02	3.41E+01*	8.69E+02	1.28E+03	8.35E+02	3.19E+02	7.97E+01	1.35E+01*	1.59E+00*	1.28E-01*	6.86E-03*
7	.1786	.1853	.1923	.1999	.2079	.2164	.2255	.2352	.2456	.2568	.2689
	55984.9	53972.4	51989.3	50035.6	48111.4	46216.9	44352.2	42517.5	40712.9	38938.5	37194.7
	3.63E-02	8.24E-02	8.31E-03	4.05E-02	1.43E-01	1.46E-01	7.87E-02	2.63E-02	5.83E-03	8.78E-04	8.92E-05
	1.3077	1.3288	1.3429	1.3958	1.4221	1.4538	1.4885	1.5263	1.5678	1.6142	1.6673
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.46E+02	9.08E+02	8.18E+01*	3.55E+02	1.12E+03	1.01E+03	4.81E+02	1.42E+02	2.76E+01*	3.63E+00*	3.22E-01*

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g - X\ ^1\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.1227	.1263	.1301	.1340	.1382	.1426	.1472	.1520	.1571	.1624	.1681
	81507.0	79176.6	76875.0	74602.2	72358.1	70142.9	67956.4	65798.8	63670.1	61570.3	59499.6
	3.15E-02	9.21E-02	3.30E-02	1.86E-02	5.32E-02	4.12E-03	5.46E-02	4.27E-03	5.14E-02	1.59E-02	3.42E-02
	1.0450	1.0648	1.0865	1.1009	1.1256	1.1347	1.1674	1.1756	1.2126	1.2272	1.2628
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.20E+03	3.20E+03	1.05E+03	5.40E+02	1.41E+03	9.96E+01*	1.20E+03	8.52E+01*	9.29E+02	2.59E+02	5.05E+02
9	.1206	.1240	.1277	.1315	.1355	.1397	.1441	.1487	.1536	.1587	.1641
	82952.9	80622.5	78320.9	76048.1	73804.1	71588.8	69402.3	67244.7	65116.0	63016.3	60945.5
	1.79E-02	7.37E-02	6.04E-02	1.69E-04	5.48E-02	9.31E-03	3.93E-02	1.66E-02	3.76E-02	1.32E-02	4.94E-02
	1.0333	1.0527	1.0730	1.0522	1.1109	1.1380	1.1505	1.1791	1.1930	1.2258	1.2397
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.17E+02	2.71E+03	2.03E+03	5.20E+00*	1.54E+03	2.39E+02*	9.20E+02	3.53E+02	7.28E+02	2.31E+02	7.84E+02
10	.1185	.1219	.1254	.1291	.1329	.1370	.1412	.1456	.1503	.1552	.1603
	84371.6	82041.3	79739.7	77466.9	75222.8	73007.6	70821.1	68663.5	66534.8	64435.0	62364.3
	9.85E-03	5.32E-02	7.34E-02	9.44E-03	2.81E-02	3.92E-02	4.85E-03	4.77E-02	6.68E-04	4.98E-02	1.16E-03
	1.0220	1.0409	1.0606	1.0840	1.0965	1.1202	1.1293	1.1603	1.1476	1.2033	1.1953
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.14E+02*	2.06E+03	2.61E+03	3.07E+02*	8.37E+02	1.07E+03	1.21E+02*	1.08E+03	1.38E+01*	9.33E+02	1.96E+01*
11	.1166	.1199	.1233	.1268	.1305	.1344	.1385	.1427	.1472	.1519	.1568
	85763.4	83433.1	81131.5	78858.6	76614.6	74399.3	72212.9	70055.3	67926.5	65826.8	63756.1
	5.26E-03	3.56E-02	7.15E-02	3.15E-02	4.64E-03	4.91E-02	5.11E-03	3.39E-02	1.84E-02	2.38E-02	2.45E-02
	1.0111	1.0297	1.0489	1.0695	1.0794	1.1059	1.1346	1.1441	1.1716	1.1841	1.2145
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.32E+02*	1.45E+03	2.68E+03	1.08E+03	1.46E+02*	1.42E+03	1.35E+02*	8.16E+02	4.04E+02	4.76E+02	4.45E+02
12	.1148	.1179	.1212	.1247	.1282	.1320	.1359	.1400	.1443	.1488	.1536
	87128.3	84797.9	82496.4	80223.5	77979.5	75764.2	73577.7	71420.1	69291.4	67191.7	65120.9
	2.75E-03	2.26E-02	6.05E-02	5.06E-02	1.10E-03	3.39E-02	2.89E-02	5.42E-03	4.20E-02	2.81E-06	4.31E-02
	1.0005	1.0188	1.0376	1.0572	1.0897	1.0924	1.1156	1.1245	1.1541	1.6827	1.1951
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.27E+02*	9.64E+02	2.38E+03	1.83E+03	3.67E+01*	1.00E+03	8.06E+02	1.38E+02*	9.78E+02	5.98E-02*	8.33E+02
13	.1130	.1161	.1193	.1226	.1261	.1297	.1335	.1374	.1416	.1459	.1505
	88466.4	86136.1	83834.5	81561.6	79317.6	77102.3	74915.9	72758.2	70629.5	68529.8	66459.1
	1.41E-03	1.37E-02	4.64E-02	5.93E-02	1.38E-02	1.09E-02	4.24E-02	2.59E-03	3.00E-02	1.88E-02	1.48E-02
	.9903	1.0084	1.0268	1.0458	1.0673	1.0781	1.1017	1.1332	1.1386	1.1653	1.1759
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	6.86E+01*	6.13E+02	1.92E+03	2.25E+03	4.82E+02	3.49E+02	1.25E+03	7.00E+01*	7.39E+02	4.24E+02	3.05E+02
14	.1114	.1144	.1174	.1207	.1240	.1275	.1312	.1350	.1390	.1432	.1476
	89777.9	87447.6	85146.0	82873.1	80629.1	78413.8	76227.4	74069.7	71941.0	69841.3	67770.6
	7.19E-04	8.05E-03	3.32E-02	5.79E-02	3.12E-02	2.50E-04	3.46E-02	2.10E-02	6.07E-03	3.71E-02	3.79E-04
	.9805	.9983	1.0163	1.0349	1.0547	1.0398	1.0888	1.1119	1.1205	1.1488	1.2111
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	3.65E+01*	3.77E+02*	1.43E+03	2.31E+03	1.14E+03	8.44E+00*	1.07E+03	5.97E+02	1.58E+02*	8.86E+02	8.26E+00*
15	.1098	.1127	.1157	.1188	.1221	.1255	.1290	.1327	.1366	.1406	.1448
	91062.9	88732.6	86431.0	84158.2	81914.1	79698.8	77512.4	75354.8	73226.1	71126.3	69055.6
	3.63E-04	4.61E-03	2.24E-02	5.00E-02	4.42E-02	4.29E-03	1.65E-02	3.57E-02	1.04E-03	2.72E-02	1.81E-02
	.9710	.9885	1.0063	1.0245	1.0435	1.0677	1.0758	1.0983	1.1358	1.1340	1.1599
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E 03	5.88E-03	5.88E-03
	1.92E+01*	2.26E+02*	1.01E+03	2.09E+03	1.70E+03	1.52E+02*	5.38E+02	1.07E+03	2.87E+01*	6.85E+02	4.18E+02

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g - X\ ^1\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
8	.1740	.1804	.1870	.1941	.2017	.2097	.2182	.2273	.2370	.2475	.2586
	57458.0	55445.6	53462.5	51508.8	49584.6	47690.1	45825.4	43990.6	42186.0	40411.7	38667.8
	5.11E-02	2.34E-03	7.72E-02	4.34E-02	5.16E-03	1.03E-01	1.59E-01	1.09E-01	4.34E-02	1.10E-02	1.86E-03
	1.2809	1.3373	1.3385	1.3604	1.4199	1.4315	1.4623	1.4968	1.5346	1.5763	1.6230
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	6.79E+02	2.79E+01*	8.27E+02	4.15E+02	4.41E+01*	7.82E+02	1.07E+03	6.51E+02	2.28E+02	5.10E+01	7.53E+00*
9	.1698	.1758	.1821	.1888	.1960	.2035	.2115	.2201	.2292	.2389	.2493
	58903.9	56891.5	54908.4	52954.7	51030.5	49136.0	47271.3	45436.5	43631.9	41857.6	40113.8
	2.26E-03	6.43E-02	8.99E-03	4.11E-02	7.55E-02	3.34E-03	5.45E-02	1.52E-01	1.37E-01	6.56E-02	1.92E-02
	1.2902	1.2912	1.3033	1.3496	1.3712	1.3729	1.4424	1.4712	1.5053	1.5431	1.5850
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	3.24E+01*	8.29E+02	1.04E+02*	4.28E+02	7.03E+02	2.77E+01*	4.03E+02	9.97E+02	7.97E+02	3.37E+02	8.69E+01
10	.1658	.1715	.1775	.1839	.1907	.1978	.2054	.2134	.2220	.2311	.2408
	60322.7	58310.3	56327.1	54373.4	52449.3	50554.7	48690.0	46855.3	45050.7	43276.4	41532.5
	5.07E-02	8.93E-03	4.01E-02	4.03E-02	7.48E-03	8.02E-02	2.85E-02	1.59E-02	1.24E-01	1.56E-01	9.15E-02
	1.2500	1.2611	1.3020	1.3199	1.3691	1.3813	1.4019	1.4590	1.4806	1.5141	1.5518
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.79E+02	1.24E+02*	5.02E+02	4.54E+02	7.56E+01*	7.26E+02	2.30E+02	1.15E+02	7.97E+02	8.87E+02	4.59E+02
11	.1620	.1675	.1733	.1793	.1857	.1925	.1997	.2073	.2153	.2239	.2330
	61714.4	59702.0	57718.9	55765.2	53841.0	51946.5	50081.8	48247.1	46442.4	44668.1	42924.3
	2.46E-02	2.15E-02	3.78E-02	8.48E-03	6.08E-02	1.67E-03	5.64E-02	6.07E-02	1.42E-04	8.45E-02	1.62E-01
	1.2279	1.2621	1.2768	1.3193	1.3309	1.3197	1.3920	1.4143	1.6356	1.4911	1.5233
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.05E+02	3.21E+02	5.09E+02	1.03E+02*	6.64E+02	1.64E+01*	4.96E+02	4.78E+02	9.96E-01*	5.27E+02	8.97E+02
12	.1585	.1638	.1693	.1750	.1811	.1876	.1944	.2016	.2092	.2172	.2258
	63079.3	61066.9	59083.8	57130.1	55205.9	53311.4	51446.7	49611.9	47807.3	46033.0	44289.2
	1.15E-03	4.51E-02	5.86E-04	5.12E-02	1.19E-03	5.17E-02	2.27E-02	2.27E-02	7.92E-02	9.30E-03	4.35E-02
	1.2472	1.2393	1.3127	1.2877	1.2724	1.3417	1.3578	1.4059	1.4250	1.4362	1.5041
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.02E+01*	7.20E+02	8.47E+00*	6.68E+02	1.40E+01*	5.49E+02	2.17E+02	1.95E+02	6.07E+02	6.36E+01*	2.65E+02
13	.1552	.1602	.1655	.1710	.1769	.1830	.1894	.1963	.2035	.2111	.2192
	64417.4	62405.0	60421.9	58468.2	56544.0	54649.5	52784.8	50950.1	49145.4	47371.1	45627.3
	3.06E-02	8.52E-03	3.59E-02	9.56E-03	3.54E-02	2.06E-02	2.38E-02	4.91E-02	1.76E-03	7.40E-02	3.48E-02
	1.2058	1.2148	1.2502	1.2598	1.2990	1.3126	1.3547	1.3709	1.4484	1.4357	1.4564
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	5.73E+02	1.45E+02*	5.54E+02	1.34E+02*	4.48E+02	2.35E+02	2.45E+02	4.55E+02	1.46E+01*	5.51E+02	2.32E+02
14	.1521	.1569	.1620	.1673	.1728	.1787	.1849	.1913	.1982	.2054	.2130
	65728.9	63716.5	61733.4	59779.7	57855.5	55961.0	54096.3	52261.6	50456.9	48682.6	46938.8
	3.54E-02	6.22E-03	3.12E-02	1.09E-02	3.29E-02	9.66E-03	4.33E-02	2.41E-03	5.87E-02	4.64E-03	4.94E-02
	1.1879	1.2221	1.2296	1.2648	1.2751	1.3154	1.3256	1.3872	1.3821	1.3834	1.4473
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.04E+02	1.13E+02*	5.15E+02	1.63E+02	4.46E+02	1.19E+02*	4.80E+02	2.41E+01*	5.29E+02	3.75E+01*	3.58E+02
15	.1492	.1538	.1587	.1638	.1691	.1747	.1806	.1868	.1933	.2001	.2074
	67014.0	65001.5	63018.4	61064.7	59140.5	57246.0	55381.3	53546.6	51742.0	49967.6	48223.8
	9.41E-03	3.21E-02	1.53E-03	3.81E-02	8.47E-05	4.20E-02	1.89E-04	4.66E-02	3.75E-03	4.53E-02	2.56E-02
	1.1685	1.1987	1.1925	1.2407	1.1331	1.2865	1.2083	1.3369	1.3358	1.3938	1.4093
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.98E+02*	6.17E+02	2.69E+01*	6.08E+02	1.23E+00*	5.53E+02	2.25E+00*	5.02E+02	3.64E+01*	3.96E+02	2.01E+02

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
16	.1083	.1111	.1140	.1171	.1202	.1235	.1270	.1305	.1343	.1382	.1422
	92321.6	89991.3	87689.7	85416.9	83172.8	80957.5	78771.1	76613.5	74484.8	72385.0	70314.3
	1.82E-04	2.59E-03	1.46E-02	3.97E-02	4.96E-02	1.68E-02	2.93E-03	3.41E-02	1.47E-02	6.94E-03	3.30E-02
	.9618	.9791	.9966	1.0145	1.0329	1.0532	1.0593	1.0859	1.1090	1.1173	1.1443
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.01E+01*	1.32E+02*	6.88E+02	1.73E+03	2.00E+03	6.23E+02	1.00E+02*	1.07E+03	4.24E+02	1.84E+02*	8.04E+02
17	.1069	.1096	.1125	.1154	.1185	.1217	.1250	.1285	.1321	.1358	.1398
	93554.2	91223.8	88922.2	86649.4	84405.4	82190.1	80003.6	77846.0	75717.3	73617.6	71546.8
	9.16E-05	1.44E-03	9.17E-03	2.96E-02	4.80E-02	2.99E-02	4.20E-04	2.08E-02	2.91E-02	2.02E-04	2.53E-02
	.9530	.9700	.9873	1.0049	1.0229	1.0420	1.0821	1.0737	1.0956	1.1563	1.1302
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	5.25E+00*	7.66E+01*	4.52E+02*	1.35E+03	2.02E+03	1.16E+03	1.51E+01*	6.89E+02	8.84E+02	5.64E+00*	6.49E+02
18	.1055	.1082	.1110	.1138	.1168	.1199	.1231	.1265	.1300	.1336	.1375
	94760.7	92430.4	90128.8	87856.0	85611.9	83396.6	81210.2	79052.6	76923.9	74824.1	72753.4
	4.61E-05	7.92E-04	5.64E-03	2.10E-02	4.20E-02	3.88E-02	7.19E-03	7.11E-03	3.20E-02	9.54E-03	8.08E-03
	.9445	.9613	.9783	.9956	1.0133	1.0317	1.0534	1.0605	1.0836	1.1072	1.1148
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.75E+00*	4.38E+01*	2.89E+02*	9.98E+02	1.85E+03	1.58E+03	2.70E+02*	2.46E+02*	1.02E+03	2.80E+02*	2.18E+02*
19	.1042	.1068	.1095	.1123	.1152	.1182	.1214	.1246	.1280	.1316	.1353
	95941.5	93611.1	91309.5	89036.7	86792.6	84577.4	82390.9	80233.3	78104.6	76004.8	73934.1
	2.32E-05	4.34E-04	3.40E-03	1.44E-02	3.42E-02	4.21E-02	1.79E-02	3.42E-04	2.37E-02	2.27E-02	1.62E-05
	.9363	.9528	.9696	.9867	1.0041	1.0220	1.0415	1.0291	1.0721	1.0936	.9604
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.44E+00*	2.49E+01*	1.82E+02*	7.11E+02	1.56E+03	1.78E+03	7.01E+02	1.24E+01*	7.91E+02	6.98E+02	4.59E-01*
20	.1030	.1055	.1081	.1109	.1137	.1166	.1197	.1229	.1262	.1296	.1332
	97096.5	94766.2	92464.6	90191.8	87947.7	85732.5	83546.0	81388.4	79259.7	77159.9	75089.2
	1.18E-05	2.37E-04	2.03E-03	9.57E-03	2.63E-02	4.05E-02	2.77E-02	1.84E-03	1.16E-02	2.87E-02	5.46E-03
	.9285	.9448	.9613	.9781	.9952	1.0128	1.0312	1.0581	1.0604	1.0820	1.1068
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.57E-01*	1.41E+01*	1.12E+02*	4.92E+02*	1.25E+03	1.79E+03	1.13E+03	6.95E+01*	4.05E+02	9.22E+02	1.62E+02*
21	.1018	.1043	.1068	.1095	.1123	.1151	.1181	.1212	.1244	.1277	.1312
	98226.2	95895.8	93594.2	91321.4	89077.4	86862.1	84675.6	82518.0	80389.3	78289.6	76218.8
	6.04E-06	1.29E-04	1.20E-03	6.23E-03	1.94E-02	3.58E-02	3.38E-02	8.81E-03	2.70E-03	2.49E-02	1.66E-02
	.9211	.9370	.9533	.9698	.9867	1.0039	1.0218	1.0423	1.0455	1.0711	1.0925
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	4.01E-01*	7.99E+00*	6.89E+01*	3.33E+02*	9.63E+02	1.64E+03	1.44E+03	3.47E+02*	9.84E+01*	8.38E+02	5.16E+02

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 6. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
16	.1465	.1509	.1556	.1605	.1656	.1709	.1766	.1825	.1887	.1952	.2021
	68272.7	66260.3	64277.1	62323.4	60399.2	58504.7	56640.0	54805.3	53000.7	51226.3	49482.5
	8.64E-04	2.87E-02	1.12E-02	1.86E-02	2.19E-02	1.28E-02	2.81E-02	1.34E-02	2.89E-02	2.31E-02	2.03E-02
	1.1907	1.1817	1.2121	1.2205	1.2527	1.2617	1.2984	1.3080	1.3493	1.3618	1.4083
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.93E+01*	5.84E+02	2.09E+02	3.15E+02	3.38E+02	1.80E+02	3.57E+02	1.55E+02	3.02E+02	2.18E+02	1.73E+02
17	.1439	.1482	.1526	.1573	.1623	.1674	.1728	.1785	.1844	.1906	.1972
	69505.2	67492.8	65509.7	63556.0	61631.8	59737.3	57872.6	56037.8	54233.2	52458.9	50715.1
	1.67E-02	6.36E-03	3.09E-02	2.41E-10	3.30E-02	3.12E-03	3.14E-02	7.16E-03	3.31E-02	7.32E-03	4.20E-02
	1.1555	1.1619	1.1926	-63.3420	1.2326	1.2755	1.2757	1.3164	1.3227	1.3690	1.3752
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	3.93E+02	1.37E+02*	6.08E+02	4.33E-06*	5.42E+02	4.66E+01*	4.27E+02	8.82E+01*	3.70E+02	7.40E+01*	3.84E+02
18	.1414	.1456	.1499	.1544	.1591	.1641	.1693	.1747	.1804	.1863	.1926
	70711.8	68699.3	66716.2	64762.5	62838.3	60943.8	59079.1	57244.4	55439.8	53665.4	51921.6
	2.93E-02	1.09E-03	2.35E-02	1.44E-02	9.98E-03	2.73E-02	2.37E-03	3.45E-02	3.06E-04	3.93E-02	2.20E-04
	1.1406	1.1827	1.1765	1.2052	1.2116	1.2442	1.2400	1.2874	1.2306	1.3347	1.2471
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	7.27E+02	2.47E+01*	4.89E+02	2.74E+02	1.73E+02*	4.34E+02	3.42E+01*	4.53E+02	3.65E+00*	4.26E+02	2.16E+00*
19	.1391	.1431	.1473	.1516	.1562	.1610	.1659	.1712	.1766	.1823	.1883
	71892.5	69880.1	67897.0	65943.2	64019.1	62124.6	60259.8	58425.1	56620.5	54846.2	53102.3
	2.40E-02	1.47E-02	4.78E-03	2.85E-02	6.91E-04	2.60E-02	9.44E-03	1.77E-02	1.97E-02	1.21E-02	2.69E-02
	1.1271	1.1521	1.1566	1.1877	1.2440	1.2256	1.2592	1.2653	1.3003	1.3072	1.3474
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	6.24E+02	3.51E+02	1.05E+02*	5.73E+02	1.27E+01*	4.37E+02	1.45E+02*	2.47E+02	2.51E+02	1.39E+02	2.83E+02
20	.1369	.1408	.1448	.1490	.1534	.1580	.1628	.1678	.1731	.1786	.1843
	73047.6	71035.2	69052.0	67098.3	65174.1	63279.6	61414.9	59580.2	57775.6	56001.3	54257.4
	9.51E-03	2.60E-02	9.87E-04	2.00E-02	1.58E-02	5.09E-03	2.80E-02	4.22E-06	3.02E-02	3.34E-03	2.85E-02
	1.1130	1.1377	1.1796	1.1722	1.1999	1.2026	1.2373	1.8198	1.2782	1.3242	1.3223
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	2.60E+02*	6.52E+02	2.28E+01*	4.22E+02	3.05E+02	9.03E+01*	4.54E+02	6.26E-02*	4.09E+02	4.11E+01*	3.19E+02
21	.1348	.1386	.1425	.1466	.1508	.1553	.1599	.1647	.1698	.1750	.1805
	74177.2	72164.8	70181.7	68228.0	66303.8	64409.3	62544.6	60709.8	58905.2	57130.9	55387.1
	5.12E-04	2.30E-02	1.23E-02	4.13E-03	2.59E-02	1.77E-03	1.98E-02	1.44E-02	7.95E-03	2.63E-02	1.35E-03
	1.0820	1.1249	1.1496	1.1528	1.1837	1.2250	1.2196	1.2506	1.2543	1.2904	1.2740
	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03	5.88E-03
	1.46E+01*	6.05E+02	2.98E+02	9.19E+01*	5.29E+02	3.30E+01*	3.39E+02	2.25E+02	1.14E+02*	3.44E+02	1.61E+01*

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	8.2515	-33.9751	-5.6281	-3.0905	-2.1408	-1.6437	-1.3381	-1.1312	-.9819	-.8691	-.7808
	1211.9	-294.3	-1776.8	-3235.7	-4671.3	-6083.7	-7473.3	-8840.2	-10184.6	-11506.7	-12806.7
	6.01E-01	2.81E-01	8.75E-02	2.32E-02	5.70E-03	1.36E-03	3.19E-04	7.55E-05	1.81E-05	4.42E-06	1.11E-06
	1.2527	1.2008	1.1576	1.1203	1.0876	1.0583	1.0318	1.0078	.9859	.9657	.9473
	2.12E-01	2.28E-01	2.42E-01	2.53E-01	2.63E-01	2.72E-01	2.79E-01	2.86E-01	2.92E-01	2.97E-01	3.01E-01
	9.74E+01	-1.51E+00	-1.16E+02	-2.04E+02	-1.63E+02	-9.13E+01	-4.21E+01	-1.73E+01	-6.59E+00	-2.40E+00	-8.53E-01
	9.74E+01	-1.51E+00	-1.17E+02	-2.05E+02	-1.64E+02*	-9.20E+01*	-4.25E+01*	-1.75E+01*	-6.67E+00*	-2.43E+00*	-8.66E-01*
1	3.4743	7.2886	-90.5412	-6.3721	-3.3279	-2.2638	-1.7221	-1.3940	-1.1739	-1.0162	-.8976
	2878.2	1372.0	-110.4	-1569.3	-3004.9	-4417.4	-5807.0	-7173.9	-8518.3	-9840.4	-11140.3
	3.30E-01	1.47E-01	2.78E-01	1.57E-01	6.04E-02	1.95E-02	5.75E-03	1.62E-03	4.45E-04	1.22E-04	3.34E-05
	1.3101	1.2688	1.2095	1.1648	1.1269	1.0938	1.0643	1.0378	1.0137	.9917	.9715
	1.94E-01	2.07E-01	2.26E-01	2.40E-01	2.51E-01	2.61E-01	2.70E-01	2.78E-01	2.84E-01	2.90E-01	2.95E-01
	5.98E+02	3.30E+01	-7.74E-02	-1.41E+02	-4.20E+02	-4.66E+02	-3.33E+02	-1.87E+02	-9.01E+01	-3.95E+01	-1.63E+01
	5.98E+02	3.30E+01	-7.74E-02	-1.41E+02	-4.21E+02	-4.67E+02	-3.35E+02*	-1.88E+02*	-9.10E+01*	-4.00E+01*	-1.65E+01*
2	2.2140	3.3217	6.5442	144.5651	-7.3185	-3.5986	-2.3990	-1.8066	-1.4535	-1.2192	-1.0524
	4516.8	3010.5	1528.1	69.2	-1366.4	-2778.9	-4168.4	-5535.3	-6879.7	-8201.8	-9501.8
	6.39E-02	4.06E-01	8.92E-03	1.85E-01	1.80E-01	9.62E-02	3.95E-02	1.41E-02	4.64E-03	1.46E-03	4.50E-04
	1.3798	1.3196	1.3294	1.2196	1.1723	1.1336	1.1001	1.0705	1.0438	1.0196	.9975
	1.72E-01	1.91E-01	1.88E-01	2.23E-01	2.37E-01	2.49E-01	2.60E-01	2.68E-01	2.76E-01	2.83E-01	2.88E-01
	3.52E+02	8.17E+02	2.27E+00	6.14E-03	-1.05E+02	-5.20E+02	-7.80E+02	-6.96E+02	-4.66E+02	-2.61E+02	-1.30E+02
	3.51E+02	8.17E+02	2.28E+00*	6.13E-03	-1.05E+02	-5.21E+02	-7.83E+02	-7.00E+02	-4.69E+02*	-2.64E+02*	-1.32E+02*
3	1.6320	2.1639	3.1859	5.9526	40.9231	-8.5609	-3.9098	-2.5481	-1.8979	-1.5172	-1.2673
	6127.5	4621.3	3138.8	1679.9	244.4	-1168.1	-2557.7	-3924.6	-5269.0	-6591.1	-7891.1
	5.25E-03	1.48E-01	3.60E-01	1.23E-02	9.04E-02	1.63E-01	1.19E-01	6.11E-02	2.59E-02	9.88E-03	3.53E-03
	1.4705	1.3885	1.3300	1.2070	1.2329	1.1804	1.1406	1.1066	1.0766	1.0498	1.0255
	1.45E-01	1.69E-01	1.87E-01	2.26E-01	2.18E-01	2.35E-01	2.47E-01	2.58E-01	2.66E-01	2.74E-01	2.81E-01
	5.13E+01	8.45E+02	7.92E+02	6.06E+00	1.27E-01	-5.81E+01	-4.95E+02	-9.92E+02	-1.09E+03	-8.61E+02	-5.54E+02
	5.03E+01*	8.43E+02	7.94E+02	6.03E+00	1.27E-01	-5.80E+01	-4.95E+02	-9.95E+02	-1.10E+03	-8.67E+02*	-5.59E+02*
4	1.2969	1.6118	2.1178	3.0647	5.4722	24.0982	-10.2605	-4.2708	-2.7130	-1.9968	-1.5853
	7710.6	6204.4	4721.9	3263.0	1827.4	415.0	-974.6	-2341.5	-3685.9	-5008.0	-6308.0
	1.69E-04	1.77E-02	2.26E-01	2.68E-01	6.19E-02	2.82E-02	1.24E-01	1.26E-01	7.94E-02	3.97E-02	1.73E-02
	1.6063	1.4796	1.3974	1.3421	1.2483	1.2562	1.1895	1.1478	1.1131	1.0829	1.0559
	1.08E-01	1.42E-01	1.67E-01	1.84E-01	2.13E-01	2.11E-01	2.32E-01	2.45E-01	2.56E-01	2.65E-01	2.72E-01
	(1.83E+00)	1.73E+02	1.34E+03	6.37E+02	3.48E+01	1.82E-01	-2.51E+01	-3.92E+02	-1.05E+03	-1.41E+03	-1.31E+03
	1.66E+00*	1.70E+02	1.34E+03	6.40E+02	3.47E+01	1.81E-01	-2.50E+01	-3.92E+02	-1.05E+03	-1.42E+03	-1.31E+03
5	1.0792	1.2887	1.5930	2.0753	2.9560	5.0750	17.2160	-12.7221	-4.6939	-2.8964	-2.1041
	9266.1	7759.8	6277.4	4818.5	3382.9	1970.4	580.9	-786.0	-2130.4	-3452.5	-4752.5
	1.25E-06	7.29E-04	3.73E-02	2.88E-01	1.74E-01	1.11E-01	2.10E-03	7.97E-02	1.16E-01	9.11E-02	5.32E-02
	1.9156	1.6185	1.4890	1.4067	1.3570	1.2637	1.3609	1.2003	1.1554	1.1199	1.0892
	4.73E-02	1.05E-01	1.39E-01	1.64E-01	1.79E-01	2.08E-01	1.78E-01	2.29E-01	2.43E-01	2.54E-01	2.63E-01
	(4.50E-03)(	7.60E+00)	3.63E+02	1.75E+03	4.38E+02	7.47E+01	2.63E-02	-8.20E+00	-2.69E+02	-9.76E+02	-1.60E+03
	7.14E-04*	6.85E+00*	3.56E+02	1.75E+03	4.41E+02	7.45E+01	2.58E-02*	-8.16E+00	-2.68E+02	-9.77E+02	-1.60E+03
6	.9264	1.0767	1.2812	1.5757	2.0363	2.8585	4.7421	13.4790	-16.5974	-5.1959	-3.1012
	10794.0	9287.8	7805.3	6346.4	4910.8	3498.4	2108.8	741.9	-602.5	-1924.6	-3224.6
	1.42E-09	6.01E-06	1.88E-03	6.27E-02	3.29E-01	9.70E-02	1.41E-01	3.49E-03	4.14E-02	9.65E-02	9.43E-02
	.3303	1.9519	1.6311	1.4985	1.4164	1.3771	1.2751	1.1300	1.2146	1.1636	1.1268
	3.18E-01	4.23E-02	1.02E-01	1.37E-01	1.61E-01	1.73E-01	2.05E-01	2.50E-01	2.24E-01	2.40E-01	2.51E-01
	(3.67E-04)(	1.75E-02)(	1.88E+01)	6.07E+02	2.04E+03	2.51E+02	1.13E+02	1.81E-01	-1.84E+00	-1.61E+02	-8.10E+02
	5.40E-04*	1.02E-03*	1.69E+01*	5.97E+02	2.04E+03	2.55E+02	1.12E+02	1.83E-01*	-1.83E+00	-1.60E+02	-8.09E+02
7	.8134	.9269	1.0746	1.2744	1.5597	2.0005	2.7706	4.4595	11.1360	-23.5783	-5.8001
	12294.5	10788.2	9305.8	7846.9	6411.3	4998.9	3609.3	2242.4	898.0	-424.1	-1724.1
	1.40E-10	1.52E-08	1.66E-05	3.78E-03	9.25E-02	3.49E-01	4.35E-02	1.50E-01	2.07E-02	1.51E-02	7.15E-02
	1.8458	.6611	1.9935	1.6442	1.5083	1.4266	1.4093	1.2855	1.1988	1.2390	1.1728
	5.81E-02	3.45E-01	3.71E-02	9.87E-02	1.34E-01	1.58E-01	1.63E-01	2.02E-01	2.29E-01	2.16E-01	2.37E-01
	(1.78E-06)(	4.59E-03)(	3.73E-02)(	3.61E+01)	8.87E+02	2.19E+03	1.10E+02	1.39E+02	1.59E+00	-2.19E-01	-8.36E+01
	1.70E-09*	3.61E-03*	4.48E-06*	3.21E+01*	8.72E+02	2.20E+03	1.13E+02	1.39E+02	1.59E+00	-2.16E-01	-8.32E+01

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
0	-.7100	-.6518	-.6033	-.5621	-.5268	-.4962	-.4694	-.4458	-.4248	-.4061	-.3892
	-14084.7	-15341.0	-16575.8	-17789.0	-18981.0	-20151.8	-21301.6	-22430.6	-23538.8	-24626.3	-25693.3
	2.84E-07	7.48E-08	2.03E-08	5.69E-09	1.64E-09	4.84E-10	1.47E-10	4.54E-11	1.43E-11	4.52E-12	1.39E-12
	.9304	.9149	.9007	.8876	.8753	.8634	.8520	.8408	.8298	.8171	.7981
	3.05E-01	3.09E-01	3.12E-01	3.15E-01	3.17E-01	3.19E-01	3.22E-01	3.24E-01	3.26E-01	3.28E-01	3.31E-01
	-2.99E-01	-1.04E-01	-3.65E-02	-1.28E-02	-4.56E-03	-1.64E-03	-5.94E-04	-2.17E-04	-8.01E-05	-2.94E-05	-1.05E-05
	-3.04E-01*	-1.06E-01*	-3.71E-02*	-1.31E-02*	-4.65E-03*	-1.67E-03*	-6.05E-04*	-2.22E-04*	-8.17E-05*	-3.00E-05*	-1.07E-05*
1	-.8053	-.7313	-.6707	-.6202	-.5775	-.5410	-.5093	-.4816	-.4572	-.4355	-.4162
	-12418.4	-13674.7	-14909.4	-16122.7	-17314.7	-18485.5	-19635.3	-20764.2	-21872.4	-22960.0	-24027.0
	9.25E-06	2.61E-06	7.49E-07	2.20E-07	6.61E-08	2.04E-08	6.40E-09	2.05E-09	6.67E-10	2.18E-10	7.12E-11
	.9530	.9359	.9203	.9059	.8927	.8804	.8687	.8571	.8449	.8313	.8151
	3.00E-01	3.04E-01	3.07E-01	3.11E-01	3.14E-01	3.16E-01	3.18E-01	3.21E-01	3.23E-01	3.25E-01	3.28E-01
	-6.46E+00	-2.49E+00	-9.51E-01	-3.61E-01	-1.37E-01	-5.20E-02	-1.99E-02	-7.65E-03	-2.95E-03	-1.13E-03	-4.31E-04
	-6.55E+00*	-2.53E+00*	-9.66E-01*	-3.67E-01*	-1.39E-01*	-5.30E-02*	-2.03E-02*	-7.80E-03*	-3.01E-03*	-1.16E-03*	-4.42E-04*
2	-.9277	-.8308	-.7535	-.6904	-.6379	-.5936	-.5557	-.5229	-.4942	-.4690	-.4467
	-10779.9	-12036.2	-13270.9	-14484.2	-15676.1	-16847.0	-17996.8	-19125.7	-20233.9	-21321.4	-22388.4
	1.37E-04	4.19E-05	1.29E-05	4.01E-06	1.27E-06	4.07E-07	1.33E-07	4.43E-08	1.50E-08	5.14E-09	1.77E-09
	.9773	.9587	.9416	.9258	.9113	.8978	.8852	.8732	.8615	.8496	.8364
	2.94E-01	2.98E-01	3.03E-01	3.06E-01	3.10E-01	3.12E-01	3.15E-01	3.18E-01	3.20E-01	3.22E-01	3.24E-01
	-6.02E+01	-2.64E+01	-1.12E+01	-4.63E+00	-1.89E+00	-7.70E-01	-3.12E-01	-1.27E-01	-5.15E-02	-2.09E-02	-8.46E-03
	-6.09E+01*	-2.67E+01*	-1.13E+01*	-4.70E+00*	-1.92E+00*	-7.83E-01*	-3.18E-01*	-1.29E-01*	-5.25E-02*	-2.13E-02*	-8.65E-03*
3	-1.0906	-.9592	-.8576	-.7768	-.7110	-.6563	-.6103	-.5709	-.5370	-.5073	-.4813
	-9169.1	-10425.4	-11660.1	-12873.4	-14065.4	-15236.2	-16386.0	-17515.0	-18623.1	-19710.7	-20777.7
	1.21E-03	4.08E-04	1.36E-04	4.54E-05	1.52E-05	5.14E-06	1.76E-06	6.11E-07	2.15E-07	7.65E-08	2.75E-08
	1.0034	.9831	.9645	.9473	.9314	.9167	.9030	.8902	.8781	.8662	.8540
	2.87E-01	2.92E-01	2.97E-01	3.01E-01	3.05E-01	3.08E-01	3.11E-01	3.14E-01	3.17E-01	3.19E-01	3.21E-01
	-3.12E+02	-1.60E+02	-7.71E+01	-3.56E+01	-1.59E+01	-7.01E+00	-3.04E+00	-1.31E+00	-5.64E-01	-2.42E-01	-1.03E-01
	-3.15E+02*	-1.62E+02*	-7.81E+01*	-3.61E+01*	-1.62E+01*	-7.12E+00*	-3.09E+00*	-1.33E+00*	-5.74E-01*	-2.46E-01*	-1.05E-01*
4	-1.3182	-1.1309	-.9924	-.8857	-.8011	-.7324	-.6755	-.6277	-.5869	-.5516	-.5210
	-7586.1	-8842.4	-10077.1	-11290.3	-12482.3	-13653.1	-14802.9	-15931.9	-17040.1	-18127.6	-19194.6
	6.95E-03	2.65E-03	9.77E-04	3.54E-04	1.27E-04	4.58E-05	1.65E-05	6.01E-06	2.21E-06	8.17E-07	3.05E-07
	1.0315	1.0093	.9889	.9702	.9529	.9370	.9221	.9083	.8954	.8830	.8709
	2.79E-01	2.85E-01	2.91E-01	2.96E-01	3.00E-01	3.04E-01	3.07E-01	3.10E-01	3.13E-01	3.16E-01	3.18E-01
	-9.59E+02	-6.04E+02	-3.42E+02	-1.80E+02	-9.03E+01	-4.36E+01	-2.05E+01	-9.48E+00	-4.33E+00	-1.96E+00	-8.85E-01
	-9.66E+02*	-6.09E+02*	-3.46E+02*	-1.83E+02*	-9.15E+01*	-4.42E+01*	-2.08E+01*	-9.63E+00*	-4.40E+00*	-2.00E+00*	-9.01E-01*
5	-1.6582	-1.3723	-1.1735	-1.0272	-.9152	-.8266	-.7549	-.6956	-.6458	-.6034	-.5669
	-6030.6	-7286.9	-8521.6	-9734.9	-10926.8	-12097.7	-13247.5	-14376.4	-15484.6	-16572.1	-17639.2
	2.64E-02	1.18E-02	4.96E-03	2.00E-03	7.83E-04	3.03E-04	1.16E-04	4.47E-05	1.72E-05	6.66E-06	2.59E-06
	1.0620	1.0375	1.0152	.9948	.9760	.9586	.9426	.9276	.9137	.9006	.8880
	2.71E-01	2.78E-01	2.84E-01	2.89E-01	2.94E-01	2.98E-01	3.02E-01	3.06E-01	3.09E-01	3.12E-01	3.15E-01
	-1.72E+03	-1.43E+03	-1.00E+03	-6.24E+02	-3.58E+02	-1.94E+02	-1.00E+02	-5.03E+01	-2.47E+01	-1.19E+01	-5.70E+00
	-1.73E+03	-1.44E+03	-1.01E+03*	-6.30E+02*	-3.62E+02*	-1.96E+02*	-1.02E+02*	-5.10E+01*	-2.51E+01*	-1.21E+01*	-5.80E+00*
6	-2.2209	-1.7364	-1.4299	-1.2185	-1.0640	-.9461	-.8533	-.7783	-.7165	-.6647	-.6207
	-4502.7	-5759.0	-6993.7	-8206.9	-9398.9	-10569.7	-11719.6	-12848.5	-13956.7	-15044.2	-16111.2
	6.44E-02	3.61E-02	1.80E-02	8.26E-03	3.61E-03	1.53E-03	6.33E-04	2.59E-04	1.05E-04	4.28E-05	1.74E-05
	1.0956	1.0682	1.0435	1.0211	1.0006	.9818	.9644	.9482	.9332	.9191	.9059
	2.61E-01	2.69E-01	2.76E-01	2.82E-01	2.88E-01	2.93E-01	2.97E-01	3.01E-01	3.05E-01	3.08E-01	3.11E-01
	-1.62E+03	-2.02E+03	-1.90E+03	-1.47E+03	-1.01E+03	-6.26E+02	-3.64E+02	-2.02E+02	-1.08E+02	-5.60E+01	-2.85E+01
	-1.62E+03	-2.03E+03	-1.91E+03	-1.48E+03*	-1.01E+03*	-6.32E+02*	-3.68E+02*	-2.04E+02*	-1.09E+02*	-5.68E+01*	-2.90E+01*
7	-3.3309	-2.3483	-1.8204	-1.4911	-1.2661	-1.1026	-.9786	-.8812	-.8028	-.7383	-.6844
	-3002.2	-4258.5	-5493.2	-6706.4	-7898.4	-9069.2	-10219.1	-11348.0	-12456.2	-13543.7	-14610.7
	8.94E-02	7.15E-02	4.53E-02	2.49E-02	1.25E-02	5.92E-03	2.69E-03	1.19E-03	5.17E-04	2.23E-04	9.54E-05
	1.1340	1.1022	1.0764	1.0496	1.0271	1.0065	.9876	.9701	.9539	.9388	.9246
	2.49E-01	2.59E-01	2.67E-01	2.74E-01	2.81E-01	2.86E-01	2.91E-01	2.96E-01	3.00E-01	3.03E-01	3.07E-01
	-6.09E+02	-1.50E+03	-2.17E+03	-2.29E+03	-1.97E+03	-1.46E+03	-9.85E+02	-6.15E+02	-3.63E+02	-2.06E+02	-1.13E+02
	-6.08E+02	-1.50E+03	-2.18E+03	-2.30E+03	-1.98E+03	-1.48E+03*	-9.95E+02*	-6.22E+02*	-3.68E+02*	-2.09E+02*	-1.15E+02*

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
8	.7263	.8156	.9277	1.0730	1.2683	1.5451	1.9676	2.6914	4.2174	9.5326	-39.8459
	13767.6	12261.4	10778.9	9320.0	7884.5	6472.0	5082.4	3715.5	2371.1	1049.0	-251.0
	8.90E-13	9.87E-10	8.36E-08	3.42E-05	6.48E-03	1.25E-01	3.52E-01	1.28E-02	1.41E-01	4.34E-02	2.13E-03
	.8519	1.9181	.8785	2.0421	1.6578	1.5184	1.4373	1.4805	1.2958	1.2196	1.3203
	3.22E-01	4.69E-02	3.16E-01	3.17E-02	9.56E-02	1.31E-01	1.55E-01	1.42E-01	1.98E-01	2.23E-01	1.91E-01
	(4.87E-07)(	8.11E-06)(	2.12E-02)(	5.62E-02)(	5.88E+01)	1.18E+03	2.23E+03	2.67E+01	1.49E+02	5.03E+00	-4.95E-03
	3.21E-07*	1.05E-06*	1.35E-02*	6.69E-03*	5.18E+01*	1.16E+03	2.25E+03	2.81E+01	1.49E+02	5.02E+00	-4.81E-03*
9	.6573	.7295	.8180	.9289	1.0718	1.2630	1.5318	1.9374	2.6198	4.0081	8.3686
	15213.5	13707.3	12224.8	10765.9	9330.4	7917.9	6528.3	5161.4	3817.0	2494.9	1194.9
	1.77E-14	1.22E-11	3.78E-09	3.22E-07	5.81E-05	9.99E-03	1.58E-01	3.41E-01	7.54E-04	1.20E-01	6.43E-02
	2.3696	1.0336	2.0006	1.0362	2.1001	1.6719	1.5287	1.4488	1.9240	1.3066	1.2327
	9.44E-03	2.79E-01	3.63E-02	2.78E-01	2.60E-02	9.23E-02	1.28E-01	1.51E-01	4.61E-02	1.95E-01	2.18E-01
	(1.13E-11)(	4.93E-06)	1.84E-05 (	6.28E-02)(	6.47E-02)(	8.56E+01)	1.47E+03	2.17E+03 (	1.81E-01)	1.44E+02	1.06E+01
	3.64E-09*	2.89E-06*	2.02E-05*	3.72E-02*	5.65E-02*	7.47E+01*	1.45E+03	2.19E+03	5.72E-02*	1.44E+02	1.06E+01
10	.6012	.6611	.7329	.8207	.9303	1.0710	1.2583	1.5197	1.9099	2.5551	3.8260
	16632.3	15126.1	13643.6	12184.7	10749.1	9336.7	7947.1	6580.2	5235.8	3913.7	2613.7
	3.93E-17	6.19E-14	7.94E-11	1.02E-08	9.75E-07	8.52E-05	1.42E-02	1.91E-01	3.22E-01	2.20E-03	9.48E-02
	2.5371	3.2137	1.1629	2.1031	1.1572	2.1709	1.6867	1.5394	1.4611	1.0159	1.3185
	4.62E-03	1.34E-04	2.40E-01	2.57E-02	2.42E-01	2.03E-02	8.90E-02	1.25E-01	1.47E-01	2.84E-01	1.91E-01
	(7.83E-15)(	7.80E-15)(	2.36E-05)(	2.48E-05)(	1.44E-01)(	5.76E-02)(	1.14E+02)	1.74E+03	2.04E+03 (	2.15E+01)	1.25E+02
	1.02E-10*	8.16E-08*	1.29E-05*	1.55E-04*	8.34E-02*	2.31E-01*	9.88E+01	1.72E+03	2.07E+03	1.94E+01*	1.25E+02
11	.5548	.6054	.6651	.7366	.8237	.9321	1.0708	1.2544	1.5088	1.8848	2.4966
	18024.1	16517.8	15035.4	13576.5	12140.9	10728.4	9338.9	7972.0	6627.6	5305.5	4005.5
	1.32E-15	8.13E-15	2.00E-13	3.62E-10	2.14E-08	2.50E-06	1.10E-04	1.90E-02	2.23E-01	2.97E-01	1.21E-02
	1.3209	1.7196	3.8656	1.2709	2.2336	1.2552	2.2607	1.7021	1.5503	1.4744	1.2161
	1.90E-01	8.19E-02	1.63E-06	2.06E-01	1.61E-02	2.11E-01	1.45E-02	8.56E-02	1.22E-01	1.44E-01	2.24E-01
	5.69E-10 (	4.97E-10)(	3.68E-18)(	7.81E-05)(	2.01E-05)(	2.78E-01)(	3.83E-02)(	1.43E+02)	1.98E+03	1.85E+03	7.87E+01
	5.90E-10*	1.87E-11*	5.19E-07*	4.01E-05*	7.42E-04*	1.61E-01*	6.76E-01*	1.22E+02	1.96E+03	1.89E+03	7.31E+01
12	.5158	.5592	.6097	.6693	.7404	.8269	.9343	1.0710	1.2512	1.4992	1.8621
	19388.9	17882.7	16400.3	14941.4	13505.8	12093.3	10703.7	9336.9	7992.5	6670.3	5370.4
	1.46E-16	1.71E-16	7.81E-14	1.28E-13	1.30E-09	3.63E-08	5.60E-06	1.27E-04	2.43E-02	2.54E-01	2.69E-01
	1.2686	.9205	1.7458	7.7711	1.3647	2.4136	1.3378	2.3796	1.7183	1.5615	1.4889
	2.07E-01	3.07E-01	7.65E-02	7.17E-27	1.77E-01	7.88E-03	1.85E-01	9.06E-03	8.21E-02	1.19E-01	1.39E-01
	9.22E-11 (	1.87E-10)(	4.08E-09)(	0.00E+00)(	2.03E-04)(	8.07E-06)(	4.76E-01)(	1.72E-02)(	1.69E+02)	2.18E+03	1.64E+03
	8.79E-11*	1.37E-10*	4.79E-11*	2.66E-06*	9.70E-05*	2.68E-03*	2.74E-01*	1.61E+00*	1.42E+02	2.16E+03	1.69E+03
13	.4825	.5203	.5637	.6143	.6737	.7445	.8304	.9368	1.0717	1.2487	1.4907
	20727.1	19220.8	17738.4	16279.5	14843.9	13431.4	12041.9	10675.0	9330.6	8008.5	6708.5
	4.61E-16	1.45E-16	1.93E-16	2.83E-13	1.52E-13	3.87E-09	4.92E-08	1.13E-05	1.29E-04	2.97E-02	2.82E-01
	1.2920	1.2086	.7697	1.9307	-9.2188	1.4500	2.6883	1.4100	2.5474	1.7353	1.5731
	1.99E-01	2.26E-01	3.35E-01	4.52E-02	0.00E+00	1.51E-01	2.30E-03	1.63E-01	4.42E-03	7.86E-02	1.16E-01
	3.31E-10 (	1.06E-10)(	2.45E-10)(	5.05E-09)(	0.00E+00)(	4.32E-04)(	9.17E-07)(	7.38E-01)(	4.13E-03)(	1.91E+02)	2.34E+03
	3.35E-10*	1.21E-10*	7.63E-11*	1.26E-08*	1.03E-05*	1.86E-04*	7.95E-03*	4.20E-01*	3.35E+00*	1.57E+02	2.33E+03
14	.4538	.4870	.5249	.5685	.6190	.6783	.7489	.8343	.9397	1.0730	1.2469
	22038.6	20532.3	19049.9	17591.0	16155.4	14742.9	13353.4	11986.5	10642.1	9320.0	8020.0
	8.68E-16	2.03E-17	1.42E-15	8.40E-16	9.92E-13	6.28E-12	9.95E-09	5.03E-08	2.09E-05	1.12E-04	3.51E-02
	1.2782	1.4596	1.3200	1.2259	2.0684	-1.3137	1.5307	3.1814	1.4752	2.8062	1.7533
	2.04E-01	1.48E-01	1.91E-01	2.21E-01	2.90E-02	5.13E-03	1.28E-01	1.63E-04	1.43E-01	1.28E-03	7.50E-02
	7.82E-10 (	7.78E-12)(	7.23E-10)(	4.51E-10)(	7.12E-09)(	1.07E-09)(	7.84E-04)(	4.64E-09)(	1.05E+00)(	3.03E-04)(	2.06E+02)
	7.84E-10*	1.00E-11*	6.49E-10*	2.64E-12*	1.04E-07*	3.26E-05*	2.88E-04*	2.02E-02*	5.85E-01*	6.24E+00*	1.66E+02
15	.4288	.4584	.4918	.5298	.5734	.6239	.6831	.7535	.8384	.9430	1.0747
	23323.6	21817.3	20334.9	18876.0	17440.4	16028.0	14638.4	13271.5	11927.1	10605.0	9305.0
	9.57E-17	9.50E-17	1.04E-15	2.66E-15	1.69E-14	2.62E-12	5.24E-11	2.25E-08	3.16E-08	3.59E-05	7.91E-05
	1.2719	1.1722	1.1845	1.3548	1.4690	2.2611	-.0113	1.6098	4.3896	1.5358	3.2694
	2.06E-01	2.37E-01	2.34E-01	1.80E-01	1.45E-01	1.45E-02	2.25E-01	1.07E-01	2.33E-08	1.26E-01	9.55E-05
	1.04E-10	1.13E-10	9.70E-10 (	1.17E-09)(	3.83E-09)(	4.59E-09)(	1.69E-05)(	1.22E-03)(	5.87E-17)(	1.39E+00)(	1.18E-06)
	1.05E-10*	1.10E-10*	9.00E-10*	1.04E-09*	6.38E-11*	6.19E-07*	8.86E-05*	3.38E-04*	4.56E-02*	7.42E-01*	1.07E+01*

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
8	-6.5401	-3.5902	-2.4875	-1.9108	-1.5564	-1.3165	-1.1434	-1.0127	-.9105	-.8285	-.7612
	-1529.0	-2785.3	-4020.0	-5233.3	-6425.3	-7596.1	-8745.9	-9874.9	-10983.0	-12070.6	-13137.6
	4.67E-02	7.82E-02	7.38E-02	5.27E-02	3.20E-02	1.75E-02	8.94E-03	4.35E-03	2.05E-03	9.44E-04	4.29E-04
	1.1837	1.1417	1.1089	1.0807	1.0557	1.0331	1.0124	.9934	.9759	.9596	.9444
	2.34E-01	2.47E-01	2.57E-01	2.65E-01	2.72E-01	2.79E-01	2.85E-01	2.90E-01	2.94E-01	2.98E-01	3.02E-01
	-3.70E+01	-4.17E+02	-1.28E+03	-2.15E+03	-2.56E+03	-2.42E+03	-1.96E+03	-1.42E+03	-9.51E+02	-5.98E+02	-3.59E+02
	-3.67E+01	-4.16E+02	-1.28E+03	-2.16E+03	-2.57E+03	-2.43E+03	-1.98E+03*	-1.44E+03*	-9.61E+02*	-6.05E+02*	-3.64E+02*
9	-120.3022	-7.4659	-3.8848	-2.6403	-2.0083	-1.6260	-1.3699	-1.1864	-1.0485	-.9412	-.8553
	-83.1	-1339.4	-2574.1	-3787.4	-4979.4	-6150.2	-7300.0	-8429.0	-9537.1	-10624.7	-11691.7
	5.58E-04	2.57E-02	6.31E-02	7.12E-02	5.76E-02	3.86E-02	2.29E-02	1.26E-02	6.54E-03	3.27E-03	1.59E-03
	.9748	1.1981	1.1499	1.1158	1.0871	1.0618	1.0391	1.0183	.9993	.9817	.9653
	2.94E-01	2.29E-01	2.44E-01	2.55E-01	2.63E-01	2.71E-01	2.77E-01	2.83E-01	2.88E-01	2.93E-01	2.97E-01
	-1.13E-04	-1.32E+01	-2.60E+02	-1.02E+03	-2.00E+03	-2.67E+03	-2.78E+03	-2.45E+03	-1.91E+03	-1.36E+03	-9.10E+02
	-1.21E-04*	-1.30E+01	-2.59E+02	-1.02E+03	-2.00E+03	-2.67E+03	-2.79E+03	-2.46E+03	-1.92E+03*	-1.38E+03*	-9.20E+02*
10	7.4870	126.0224	-8.6554	-4.2219	-2.8085	-2.1135	-1.7003	-1.4265	-1.2318	-1.0863	-.9734
	1335.7	79.4	-1155.4	-2368.6	-3560.6	-4731.4	-5881.2	-7010.2	-8118.4	-9205.9	-10272.9
	7.94E-02	7.09E-03	1.08E-02	4.66E-02	6.45E-02	5.93E-02	4.38E-02	2.83E-02	1.67E-02	9.25E-03	4.90E-03
	1.2432	1.1493	1.2211	1.1591	1.1230	1.0937	1.0681	1.0451	1.0242	1.0051	.9875
	2.15E-01	2.45E-01	2.22E-01	2.42E-01	2.53E-01	2.61E-01	2.69E-01	2.76E-01	2.81E-01	2.86E-01	2.91E-01
	1.77E+01	4.29E-04	-3.33E+00	-1.46E+02	-7.52E+02	-1.74E+03	-2.61E+03	-3.00E+03	-2.86E+03	-2.40E+03	-1.83E+03
	1.77E+01	4.33E-04*	-3.28E+00	-1.45E+02	-7.50E+02	-1.74E+03	-2.62E+03	-3.01E+03	-2.88E+03	-2.42E+03*	-1.84E+03*
11	3.6665	6.7976	42.2994	-10.2369	-4.6108	-2.9943	-2.2274	-1.7799	-1.4866	-1.2797	-1.1260
	2727.4	1471.1	236.4	-976.9	-2168.8	-3339.7	-4489.5	-5618.4	-6726.6	-7814.1	-8881.1
	6.89E-02	8.71E-02	1.81E-02	2.42E-03	3.10E-02	5.48E-02	5.79E-02	4.73E-02	3.31E-02	2.10E-02	1.24E-02
	1.3323	1.2527	1.1807	1.2801	1.1700	1.1307	1.1004	1.0743	1.0512	1.0302	1.0110
	1.87E-01	2.12E-01	2.35E-01	2.03E-01	2.38E-01	2.50E-01	2.59E-01	2.67E-01	2.74E-01	2.80E-01	2.85E-01
	9.87E+01	2.52E+01	2.67E-02	-3.78E-01	-7.27E+01	-5.18E+02	-1.43E+03	-2.43E+03	-3.06E+03	-3.17E+03	-2.85E+03
	9.88E+01	2.51E+01	2.68E-02	-3.66E-01*	-7.20E+01	-5.16E+02	-1.43E+03	-2.43E+03	-3.07E+03	-3.18E+03	-2.87E+03
12	2.4436	3.5261	6.2450	25.7719	-12.4385	-5.0638	-3.2004	-2.3510	-1.8651	-1.5506	-1.3304
	4092.3	2836.0	1601.3	388.0	-804.0	-1974.8	-3124.6	-4253.5	-5361.7	-6449.3	-7516.3
	2.62E-02	4.58E-02	8.77E-02	3.04E-02	3.37E-06	1.80E-02	4.36E-02	5.36E-02	4.86E-02	3.70E-02	2.51E-02
	1.2687	1.3492	1.2618	1.1970	-1.4890	1.1840	1.1389	1.1073	1.0807	1.0573	1.0362
	2.07E-01	1.81E-01	2.09E-01	2.30E-01	2.29E-03	2.34E-01	2.48E-01	2.57E-01	2.65E-01	2.72E-01	2.78E-01
	1.56E+02	6.96E+01	3.19E+01	1.90E-01	(-3.72E-08)	-3.06E+01	-3.31E+02	-1.11E+03	-2.14E+03	-2.97E+03	-3.33E+03
	1.47E+02	6.98E+01	3.18E+01	1.90E-01	-9.55E-03*	-3.02E+01	-3.29E+02	-1.11E+03	-2.14E+03	-2.98E+03	-3.35E+03
13	1.8415	2.3957	3.4021	5.7933	18.7209	-15.7068	-5.5976	-3.4300	-2.4853	-1.9565	-1.6186
	5430.4	4174.1	2939.4	1726.1	534.2	-636.7	-1786.5	-2915.4	-4023.6	-5111.1	-6178.1
	2.41E-01	4.15E-02	2.72E-02	8.26E-02	4.17E-02	2.28E-03	8.36E-03	3.23E-02	4.72E-02	4.78E-02	3.95E-02
	1.5047	1.2949	1.3720	1.2709	1.2088	1.0903	1.2054	1.1481	1.1144	1.0872	1.0635
	1.35E-01	1.99E-01	1.74E-01	2.06E-01	2.26E-01	2.62E-01	2.27E-01	2.45E-01	2.55E-01	2.63E-01	2.70E-01
	1.43E+03	2.41E+02	4.26E+01	3.66E+01	6.57E-01	-1.64E-01	-9.95E+00	-1.94E+02	-8.12E+02	-1.79E+03	-2.76E+03
	1.48E+03	2.29E+02	4.28E+01	3.65E+01	6.56E-01	-1.69E-01*	-9.77E+00*	-1.93E+02	-8.09E+02	-1.79E+03	-2.76E+03
14	1.4833	1.8230	2.3524	3.2920	5.4181	14.8185	-21.0533	-6.2347	-3.6872	-2.6318	-2.0548
	6741.9	5485.6	4250.9	3037.6	1845.7	674.8	-475.0	-1603.9	-2712.1	-3799.6	-4866.6
	3.08E-01	2.15E-01	5.58E-02	1.38E-02	7.36E-02	5.04E-02	7.70E-03	2.50E-03	2.18E-02	3.94E-02	4.50E-02
	1.5851	1.5220	1.3113	1.4070	1.2802	1.2185	1.1436	1.2512	1.1588	1.1220	1.0939
	1.13E-01	1.30E-01	1.93E-01	1.64E-01	2.03E-01	2.23E-01	2.46E-01	2.12E-01	2.42E-01	2.53E-01	2.61E-01
	2.46E+03	1.22E+03	3.25E+02	2.10E+01	3.87E+01	1.56E+00	-2.03E-01	-1.88E+00	-1.03E+02	-5.61E+02	-1.43E+03
	2.46E+03	1.28E+03	3.10E+02	2.12E+01	3.85E+01	1.55E+00	-2.05E-01*	-1.82E+00*	-1.02E+02	-5.58E+02	-1.43E+03
15	1.2458	1.4770	1.8064	2.3134	3.1942	5.1024	12.3451	-31.3580	-7.0073	-3.9767	-2.7920
	8026.9	6770.6	5535.9	4322.7	3130.7	1959.9	810.0	-318.9	-1427.1	-2514.6	-3581.6
	4.03E-02	3.32E-01	1.91E-01	6.79E-02	5.28E-03	6.23E-02	5.58E-02	1.47E-02	1.17E-04	1.31E-02	3.11E-02
	1.7725	1.5974	1.5410	1.3230	1.4743	1.2900	1.2273	1.1655	1.5746	1.1724	1.1303
	7.12E-02	1.10E-01	1.25E-01	1.90E-01	1.44E-01	2.00E-01	2.20E-01	2.40E-01	1.16E-01	2.37E-01	2.50E-01
	(2.14E+02)	2.54E+03	1.02E+03	4.00E+02	6.77E+00	3.81E+01	2.91E+00	-1.11E-01	(-1.85E-02)	-4.75E+01	-3.63E+02
	1.68E+02	2.55E+03	1.09E+03	3.82E+02	6.87E+00*	3.79E+01	2.90E+00	-1.12E-01	-1.23E-02*	-4.68E+01	-3.60E+02

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$-$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	0	1	2	3	4	5	6	7	8	9	10
16	.4068	.4333	.4631	.4967	.5348	.5785	.6290	.6882	.7584	.8429	.9466
	24582.3	23076.1	21593.6	20134.7	18699.1	17286.7	15897.1	14530.2	13185.8	11863.7	10563.7
	2.62E-16	2.89E-16	1.18E-16	7.78E-16	5.14E-15	8.51E-14	5.36E-12	2.59E-10	4.57E-08	3.22E-09	5.77E-05
	1.2692	1.2151	.9797	1.0836	1.4165	1.6464	2.5477	.5253	1.6911	13.2760	1.5937
	2.07E-01	2.24E-01	2.93E-01	2.64E-01	1.61E-01	9.82E-02	4.41E-03	3.44E-01	8.80E-02	0.00E+00	1.11E-01
	3.37E-10	3.61E-10	2.07E-10	(8.99E-10)	1.76E-09	(8.60E-09)(	8.49E-10)	1.90E-04	(1.64E-03)(	0.00E+00)(	1.70E+00)
	3.37E-10*	3.58E-10*	2.02E-10*	7.54E-10*	1.68E-09*	7.12E-10*	2.83E-06*	2.09E-04*	2.57E-04*	9.29E-02*	8.51E-01*
17	.3874	.4114	.4381	.4680	.5017	.5400	.5838	.6344	.6936	.7636	.8477
	25814.8	24308.6	22826.1	21367.2	19931.7	18519.2	17129.6	15762.7	14418.3	13096.2	11796.2
	7.23E-16	1.60E-16	4.84E-17	1.86E-17	3.65E-15	1.22E-14	3.80E-13	8.58E-12	9.72E-10	8.35E-08	2.80E-08
	1.2646	1.2050	1.6131	-.0693	1.1383	1.4180	1.7754	2.9954	.8326	1.7781	-3.4871
	2.08E-01	2.27E-01	1.06E-01	2.07E-01	2.48E-01	1.60E-01	7.06E-02	4.71E-04	3.25E-01	7.01E-02	1.57E-09
	1.09E-09	2.40E-10	1.32E-11	(1.57E-11)(	3.60E-09)(	4.02E-09)(	1.93E-08)(	1.51E-11)(	6.24E-04)(	1.87E-03)(	2.30E-19)
	1.09E-09*	2.39E-10*	1.27E-11*	1.19E-10*	3.00E-09*	4.70E-09*	1.22E-08*	1.03E-05*	4.35E-04*	5.37E-05*	1.73E-01*
18	.3701	.3919	.4161	.4430	.4731	.5070	.5454	.5893	.6400	.6992	.7691
	27021.4	25515.1	24032.7	22573.8	21138.2	19725.8	18336.2	16969.3	15624.9	14302.8	13002.8
	2.83E-16	3.27E-18	1.07E-16	2.31E-18	9.99E-16	1.07E-14	1.03E-14	1.41E-12	8.93E-12	3.02E-09	1.38E-07
	1.2560	1.0007	1.3781	3.7180	.9330	1.1628	1.4552	1.8799	3.9652	1.0398	1.8762
	2.11E-01	2.88E-01	1.72E-01	4.83E-06	3.05E-01	2.40E-01	1.49E-01	5.26E-02	7.64E-07	2.77E-01	5.32E-02
	5.04E-10	9.11E-12	8.97E-11	(1.25E-21)	1.77E-09	(9.63E-09)(	2.87E-09)(	3.86E-08)(	4.03E-17)(	1.37E-03)(	1.73E-03)
	5.04E-10*	9.16E-12*	9.21E-11*	1.32E-11*	1.65E-09*	7.95E-09*	5.71E-09*	8.53E-08*	3.18E-05*	8.03E-04*	1.16E-04*
19	.3546	.3746	.3966	.4210	.4480	.4783	.5124	.5510	.5950	.6458	.7050
	28202.1	26695.9	25213.4	23754.5	22318.9	20906.5	19516.9	18150.0	16805.6	15483.5	14183.5
	1.33E-17	5.73E-17	6.40E-18	2.02E-17	2.47E-16	2.42E-15	1.91E-14	7.07E-16	4.19E-12	3.10E-12	8.08E-09
	1.3176	1.2702	1.2304	.9280	.8345	.9305	1.2053	1.5658	1.9958	8.1076	1.1962
	1.91E-01	2.06E-01	2.19E-01	3.06E-01	3.25E-01	3.05E-01	2.27E-01	1.18E-01	3.68E-02	2.45E-29	2.30E-01
	2.21E-11	9.41E-11	9.98E-12	5.12E-11	5.87E-10	(4.17E-09)(	1.48E-08)(	1.20E-10)(	5.47E-08)(	0.00E+00)(	2.47E-03)
	2.22E-11*	9.46E-11*	1.06E-11*	4.98E-11*	6.01E-10*	3.74E-09*	1.17E-08*	4.97E-09*	4.62E-07*	8.61E-05*	1.31E-03*
20	.3406	.3591	.3792	.4015	.4260	.4533	.4837	.5180	.5568	.6010	.6519
	29357.2	27851.0	26368.5	24909.6	23474.0	22061.6	20672.0	19305.1	17960.7	16638.6	15338.6
	3.77E-16	1.16E-16	3.45E-17	9.85E-17	4.87E-17	2.39E-16	4.67E-15	3.14E-14	3.60E-14	1.07E-11	3.60E-12
	1.2695	1.2324	1.3889	1.2556	.8717	.6258	.9750	1.2939	1.5092	2.1233	-7.6198
	2.07E-01	2.18E-01	1.69E-01	2.11E-01	3.18E-01	3.46E-01	2.94E-01	1.99E-01	1.34E-01	2.40E-02	6.23E-35
	8.26E-10	2.42E-10	3.66E-11	1.37E-10	1.29E-10	(6.21E-10)(	7.24E-09)(	1.81E-08)(	7.55E-09)(	5.73E-08)(	0.00E+00)
	8.26E-10*	2.42E-10*	3.58E-11*	1.33E-10*	1.27E-10*	7.44E-10*	5.94E-09*	1.41E-08*	2.21E-09*	1.94E-06*	2.07E-04*
21	.3280	.3451	.3637	.3840	.4064	.4312	.4587	.4894	.5238	.5628	.6072
	30486.8	28980.6	27498.1	26039.2	24603.7	23191.2	21801.6	20434.7	19090.3	17768.2	16468.2
	4.62E-16	6.24E-17	5.56E-17	5.69E-17	2.17E-18	9.20E-18	3.51E-16	7.85E-15	2.74E-14	4.66E-13	2.29E-11
	1.2609	1.2021	1.3469	1.3093	1.5010	2.2595	.6710	1.0745	1.4712	1.5530	2.2826
	2.09E-01	2.28E-01	1.82E-01	1.94E-01	1.36E-01	1.46E-02	3.44E-01	2.67E-01	1.45E-01	1.22E-01	1.33E-02
	1.16E-09	1.60E-10	7.78E-11	7.66E-11	(1.21E-12)(	4.94E-14)	8.71E-10	(9.69E-09)(	8.06E-09)(	7.86E-08)(	3.69E-08)
	1.16E-09*	1.60E-10*	7.72E-11*	7.47E-11*	2.03E-12*	2.89E-13*	8.80E-10*	6.89E-09*	5.93E-09*	1.97E-10*	6.90E-06*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 7. Radiative transition parameters for N_2 $a\ ^1\Pi_g$–$a'\ ^1\Sigma_u^-$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
16	1.0769	1.2454	1.4718	1.7917	2.2782	3.1070	4.8338	10.6405	-59.3916	-7.9623	-4.3049
	9285.6	8029.3	6794.6	5581.4	4389.4	3218.6	2068.7	939.8	-168.4	-1255.9	-2322.9
	3.70E-05	4.50E-02	3.54E-01	1.70E-01	7.71E-02	9.90E-04	5.03E-02	5.80E-02	2.20E-02	6.31E-04	6.56E-03
	4.3673	1.7929	1.6101	1.5620	1.3316	1.6900	1.3006	1.2356	1.1795	1.0017	1.1924
	2.82E-08	6.74E-02	1.07E-01	1.19E-01	1.87E-01	8.82E-02	1.97E-01	2.17E-01	2.35E-01	2.87E-01	2.31E-01
	(4.79E-14)(	2.14E+02)	2.58E+03	8.51E+02	4.62E+02	(5.21E-01)	3.50E+01	4.61E+00	-2.36E-02	-4.18E-01	-1.78E+01
	1.71E+01*	1.62E+02	2.60E+03	9.15E+02	4.41E+02	4.46E-01*	3.48E+01	4.59E+00	-2.36E-02	-4.48E-01*	-1.74E+01*
17	.9507	1.0797	1.2458	1.4676	1.7787	2.2466	3.0291	4.6033	9.3970	-427.9173	-9.1712
	10518.2	9261.9	8027.2	6813.9	5621.9	4451.1	3301.3	2172.4	1064.2	-23.4	-1090.4
	8.71E-05	4.25E-06	4.90E-02	3.75E-01	1.52E-01	8.33E-02	3.17E-05	3.88E-02	5.71E-02	2.86E-02	3.27E-03
	1.6507	10.6530	1.8148	1.6232	1.5849	1.3380	-.7378	1.3124	1.2436	1.1902	1.1054
	9.72E-02	0.00E+00	6.34E-02	1.04E-01	1.13E-01	1.85E-01	4.42E-02	1.93E-01	2.15E-01	2.32E-01	2.58E-01
	(1.94E+00)(	0.00E+00)(	2.06E+02)	2.59E+03	7.01E+02	5.09E+02	(4.51E-03)	3.00E+01	6.44E+00	-7.96E-05	-1.14E+00
	8.70E-01*	2.58E+01*	1.50E+02	2.62E+03	7.66E+02	4.85E+02	1.44E+00*	2.99E+01	6.41E+00	-7.96E-05	-1.17E+00*
18	.8529	.9553	1.0830	1.2468	1.4645	1.7675	2.2184	2.9595	4.4039	8.4518	86.0763
	11724.7	10468.4	9233.7	8020.5	6828.5	5657.7	4507.8	3378.9	2270.7	1183.2	116.2
	2.77E-07	1.24E-04	1.06E-05	5.21E-02	3.94E-01	1.37E-01	8.67E-02	1.48E-03	2.85E-02	5.40E-02	3.39E-02
	-.3929	1.7083	-4.6256	1.8386	1.6368	1.6098	1.3425	1.0305	1.3261	1.2515	1.1993
	1.11E-01	8.43E-02	7.96E-15	5.93E-02	1.01E-01	1.07E-01	1.84E-01	2.80E-01	1.89E-01	2.12E-01	2.29E-01
	(1.12E-02)(	2.05E+00)(	1.07E-27)(	1.91E+02)	2.57E+03	(5.75E+02)	5.42E+02	9.02E+00	2.41E+01	8.17E+00	5.65E-03
	2.99E-01*	7.66E-01*	3.70E+01*	1.31E+02	2.62E+03	6.40E+02	5.14E+02	8.67E+00*	2.40E+01	8.13E+00	5.64E-03
19	.7749	.8584	.9602	1.0868	1.2486	1.4623	1.7579	2.1932	2.8973	4.2303	7.7107
	12905.5	11649.2	10414.5	9201.2	8009.2	6838.4	5688.6	4559.6	3451.4	2363.9	1296.9
	2.04E-07	1.11E-06	1.67E-04	9.86E-05	5.41E-02	4.12E-01	1.25E-01	8.75E-02	4.48E-03	1.98E-02	4.92E-02
	1.9938	.4202	1.7684	-.5650	1.8646	1.6507	1.6367	1.3451	1.1657	1.3428	1.2594
	3.71E-02	3.33E-01	7.20E-02	7.26E-02	5.50E-02	9.72E-02	1.01E-01	1.83E-01	2.39E-01	1.83E-01	2.10E-01
	(1.22E-03)(	3.95E-01)(	1.98E+00)(	8.21E-01)(	1.70E+02)	2.52E+03	(4.72E+02)	5.61E+02	2.14E+01	1.78E+01	9.57E+00
	1.75E-03*	4.79E-01*	5.38E-01*	5.07E+01*	1.07E+02	2.59E+03	5.35E+02	5.29E+02	2.05E+01*	1.78E+01	9.52E+00
20	.7112	.7810	.8643	.9656	1.0912	1.2510	1.4612	1.7499	2.1708	2.8417	4.0783
	14060.5	12804.2	11569.5	10356.3	9164.3	7993.5	6843.7	5714.7	4606.5	3519.0	2452.0
	1.92E-08	2.68E-07	3.16E-06	2.13E-04	3.24E-04	5.48E-02	4.29E-01	1.17E-01	8.62E-02	8.35E-03	1.29E-02
	1.3245	2.1460	.8075	1.8333	.3625	1.8934	1.6651	1.6651	1.3455	1.2189	1.3646
	1.89E-01	2.21E-02	3.29E-01	6.02E-02	3.24E-01	5.05E-02	9.39E-02	9.39E-02	1.83E-01	2.23E-01	1.77E-01
	(3.88E-03)(	5.60E-04)(	1.07E+00)(	1.73E+00)(	5.31E+01)(	1.45E+02)	2.46E+03	(3.88E+02)	5.69E+02	3.65E+01	1.20E+01
	1.87E-03*	8.01E-03*	7.17E-01*	2.42E-01*	6.65E+01*	8.10E+01	2.54E+03	4.49E+02	5.33E+02	3.54E+01*	1.20E+01
21	.6583	.7177	.7875	.8706	.9714	1.0961	1.2542	1.4611	1.7433	2.1512	2.7920
	15190.2	13933.9	12699.2	11485.9	10293.9	9123.1	7973.3	6844.3	5736.2	4648.6	3581.6
	9.40E-11	4.12E-08	3.02E-07	7.42E-06	2.55E-04	7.54E-04	5.40E-02	4.46E-01	1.11E-01	8.30E-02	1.26E-02
	-1.0060	1.4376	2.3649	1.0422	1.9062	.7826	1.9259	1.6800	1.6947	1.3431	1.2505
	1.78E-02	1.54E-01	9.62E-03	2.76E-01	4.86E-02	3.33E-01	4.58E-02	9.05E-02	8.72E-02	1.83E-01	2.13E-01
	(2.12E-07)(	5.39E-03)(	1.16E-04)(	1.74E+00)(	1.33E+00)(	1.29E+02)(	1.16E+02)	2.37E+03	(3.23E+02)	5.68E+02	5.29E+01
	4.46E-04*	2.25E-03*	2.48E-02	1.00E+00*	1.83E-02*	8.41E+01*	5.44E+01	2.48E+03	3.82E+02	5.26E+02	5.16E+01

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text)

Table 8. Radiative transition parameters for N_2 $w\ ^1\Delta_u$–$a\ ^1\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$.

v'\v''	0	1	2	3	4	5	6	7	8	9	10
0	3.6400	9.2512	-17.9347	-4.6118	-2.6657	-1.8843	-1.4631	-1.1997	-1.0195	-.8885	-.7891
	2747.3	1080.9	-557.6	-2168.3	-3751.4	-5306.9	-6834.8	-8335.3	-9808.5	-11254.4	-12673.1
	6.77E-01	2.82E-01	3.87E-02	1.95E-03	2.64E-05	4.22E-10	2.84E-09	2.06E-12	3.83E-13	6.43E-15	2.20E-16
	1.2493	1.3140	1.3963	1.5138	1.7438	11.7050	1.5962	-.8297	2.0385	1.3095	1.4561
	2.12E-01	1.94E-01	1.69E-01	1.32E-01	7.13E-02	0.00E+00	1.09E-01	1.05E-03	2.42E-02	1.95E-01	1.50E-01
	1.28E+03	2.71E+01	-3.86E-01	-7.09E-01	(-1.44E-02)(	0.00E+00)(	-2.16E-05)(	-2.66E-12)(	-4.28E-10)(	-7.07E-10)(	-2.05E-11)
	1.28E+03	2.73E+01	-3.90E-01	-7.04E-01*	-9.27E-03*	-1.14E-03*	-9.09E-06*	-2.06E-06*	-1.10E-08*	-6.41E-10*	-8.46E-13*
1	2.3348	3.8217	10.2240	-15.8060	-4.5131	-2.6517	-1.8871	-1.4707	-1.2088	-1.0289	-.8979
	4283.0	2616.6	978.1	-632.7	-2215.7	-3771.2	-5299.1	-6799.6	-8272.8	-9718.7	-11137.5
	2.44E-01	2.55E-01	3.98E-01	9.56E-02	6.78E-03	1.11E-04	2.76E-09	1.93E-08	3.72E-11	2.89E-12	3.57E-14
	1.1897	1.2634	1.3232	1.4050	1.5241	1.7653	-7.6412	1.6464	.0045	2.2033	1.5287
	2.28E-01	2.08E-01	1.91E-01	1.66E-01	1.29E-01	6.66E-02	0.00E+00	9.49E-02	6.03E-02	1.15E-02	1.28E-01
	2.02E+03	4.02E+02	2.75E+01	-1.35E+00	-2.50E+00	(-5.36E-02)(	0.00E+00)(	-1.11E-04)(	-1.55E-07)(	-7.08E-10)(	-1.64E-09)
	2.03E+03	3.97E+02	2.76E+01	-1.36E+00	-2.48E+00*	-3.14E-02*	-6.95E-03*	-3.57E-05*	-1.66E-05*	-1.83E-07*	-7.86E-10*
2	1.7256	2.4221	4.0158	11.3714	-14.2110	-4.4265	-2.6406	-1.8912	-1.4791	-1.2185	-1.0389
	5795.0	4128.7	2490.2	879.4	-703.7	-2259.1	-3787.1	-5287.6	-6760.7	-8206.6	-9625.4
	6.16E-02	2.87E-01	6.46E-02	4.14E-01	1.58E-01	1.47E-02	2.79E-04	7.91E-08	7.39E-08	3.09E-10	1.16E-11
	1.1419	1.1976	1.2892	1.3330	1.4140	1.5346	1.7886	-1.4596	1.6985	.4532	2.4129
	2.39E-01	2.26E-01	2.01E-01	1.88E-01	1.63E-01	1.26E-01	6.17E-02	8.94E-06	8.18E-02	1.84E-01	3.85E-03
	1.38E+03	2.09E+03	8.16E+01	2.02E+01	-2.96E+00	-5.49E+00	(-1.17E-01)(	-1.89E-12)(	-3.09E-04)(	-1.17E-05)(	-3.10E-10)
	1.40E+03	2.08E+03	7.90E+01	2.02E+01	-2.99E+00	-5.42E+00	-5.98E-02*	-2.42E-02*	-6.32E-05*	-7.38E-05*	-1.44E-06*
3	1.3729	1.7802	2.5133	4.2227	12.7379	-12.9802	-4.3510	-2.6324	-1.8968	-1.4886	-1.2290
	7283.8	5617.4	3978.9	2368.1	785.1	-770.4	-2298.3	-3798.8	-5272.0	-6717.9	-8136.7
	1.36E-02	1.23E-01	2.39E-01	3.46E-03	3.77E-01	2.17E-01	2.56E-02	5.41E-04	5.50E-07	2.08E-07	1.66E-09
	1.1014	1.1484	1.2064	1.4228	1.3438	1.4232	1.5454	1.8142	-.1812	1.7536	.7315
	2.47E-01	2.37E-01	2.24E-01	1.60E-01	1.85E-01	1.60E-01	1.23E-01	5.67E-02	3.06E-02	6.91E-02	2.52E-01
	6.48E+02	2.49E+03	1.53E+03	(2.39E+00)	1.26E+01	-5.17E+00	-9.54E+00	(-1.93E-01)(	-1.53E-04)(	-6.09E-04)(	-1.15E-04)
	6.60E+02	2.51E+03	1.52E+03	2.04E+00*	1.26E+01	-5.21E+00	-9.41E+00	-8.10E-02*	-6.32E-02*	-4.69E-05*	-2.37E-04*
4	1.1429	1.4118	1.8367	2.6084	4.4430	14.3828	-12.0097	-4.2860	-2.6272	-1.9040	-1.4990
	8749.4	7083.1	5444.6	3833.8	2250.7	695.3	-832.7	-2333.2	-3806.3	-5252.2	-6671.0
	2.85E-03	3.84E-02	1.60E-01	1.65E-01	8.04E-03	3.16E-01	2.69E-01	3.90E-02	8.89E-04	2.29E-06	4.74E-07
	1.0662	1.1075	1.1552	1.2166	1.1570	1.3558	1.4328	1.5565	1.8425	.3789	1.8139
	2.53E-01	2.46E-01	2.36E-01	2.21E-01	2.35E-01	1.81E-01	1.57E-01	1.20E-01	5.14E-02	1.61E-01	5.67E-02
	2.47E+02	1.67E+03	2.91E+03	9.18E+02	1.03E+01	7.07E+00	-7.80E+00	-1.44E+01	(-2.63E-01)(	-1.74E-02)(	-9.17E-04)
	2.53E+02*	1.70E+03	2.93E+03	9.06E+02	1.14E+01*	7.03E+00	-7.86E+00	-1.42E+01	-8.17E-02*	-1.37E-01*	-3.60E-09*
5	.9811	1.1729	1.4519	1.8951	2.7074	4.6769	16.3871	-11.2327	-4.2312	-2.6252	-1.9127
	10192.3	8526.0	6887.5	5276.7	3693.6	2138.2	610.2	-890.3	-2363.4	-3809.3	-5228.1
	5.89E-04	1.04E-02	6.70E-02	1.70E-01	9.51E-02	3.96E-02	2.49E-01	3.13E-01	5.43E-02	1.30E-03	7.10E-06
	1.0352	1.0721	1.1136	1.1624	1.2295	1.2236	1.3696	1.4427	1.5679	1.8742	.6970
	2.57E-01	2.52E-01	2.44E-01	2.34E-01	2.18E-01	2.19E-01	1.77E-01	1.54E-01	1.17E-01	4.60E-02	2.46E-01
	8.35E+01	8.31E+02	2.65E+03	2.77E+03	4.60E+02	3.77E+01	3.59E+00	-1.06E+01	-1.97E+01	(-3.07E-01)(	-1.25E-01)
	8.59E+01*	8.49E+02	2.69E+03	2.77E+03	4.48E+02	3.91E+01	3.56E+00	-1.07E+01	-1.94E+01	-5.69E-02*	-2.59E-01*
6	.8611	1.0054	1.2037	1.4932	1.9554	2.8101	4.9246	18.8635	-10.6042	-4.1860	-2.6263
	11612.7	9946.4	8307.9	6697.1	5114.0	3558.6	2030.6	530.1	-943.0	-2388.9	-3807.7
	1.23E-04	2.65E-03	2.27E-02	9.22E-02	1.56E-01	4.36E-02	7.65E-02	1.86E-01	3.47E-01	7.10E-02	1.74E-03
	1.0078	1.0410	1.0780	1.1199	1.1700	1.2488	1.2446	1.3860	1.4529	1.5796	1.9102
	2.60E-01	2.56E-01	2.51E-01	2.43E-01	2.32E-01	2.12E-01	2.14E-01	1.72E-01	1.51E-01	1.13E-01	4.03E-02
	2.64E+01	3.48E+02	1.66E+03	3.32E+03	2.29E+03	1.80E+02	5.91E+01	1.66E+00	-1.35E+01	-2.51E+01	(-3.15E-01)
	2.72E+01*	3.57E+02*	1.69E+03	3.35E+03	2.28E+03	1.72E+02	6.03E+01	1.64E+00	-1.36E+01	-2.46E+01	-1.87E-02*
7	.7686	.8815	1.0303	1.2353	1.5356	2.0175	2.9165	5.1860	21.9722	-10.0931	-4.1502
	13010.9	11344.5	9706.0	8095.2	6512.2	4956.7	3428.8	1928.3	455.1	-990.8	-2409.6
	2.62E-05	6.57E-04	6.91E-03	3.80E-02	1.09E-01	1.29E-01	1.30E-02	1.07E-01	1.31E-01	3.73E-01	8.85E-02
	.9837	1.0136	1.0468	1.0839	1.1263	1.1782	1.2881	1.2576	1.4061	1.4635	1.5917
	2.63E-01	2.60E-01	2.56E-01	2.50E-01	2.42E-01	2.31E-01	2.01E-01	2.10E-01	1.66E-01	1.48E-01	1.10E-01
	8.07E+00	1.31E+02	8.36E+02	2.55E+03	3.57E+03	1.70E+03	4.32E+01	6.88E+01	6.88E-01	-1.61E+01	-3.02E+01
	8.35E+00*	1.35E+02*	8.57E+02*	2.60E+03	3.60E+03	1.68E+03	3.97E+01	6.95E+01	6.78E-01	-1.62E+01	-2.96E+01

Table 8. Radiative transition parameters for N_2 $w\ ^1\Delta_u$–$a\ ^1\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	-.7110	-.6481	-.5964	-.5531	-.5164	-.4849	-.4575	-.4336	-.4125	-.3937	-.3770
	-14064.9	-15429.8	-16767.9	-18079.4	-19364.4	-20623.1	-21855.6	-23062.1	-24242.8	-25397.7	-26526.8
	1.20E-15	1.20E-15	2.65E-16	2.21E-17	1.90E-16	8.24E-17	1.97E-18	7.35E-17	7.24E-17	9.51E-18	9.96E-18
	1.1606	1.1534	1.0886	1.6056	1.2963	1.2379	1.5063	1.2736	1.2397	1.1672	1.3105
	2.35E-01	2.36E-01	2.49E-01	1.06E-01	1.99E-01	2.15E-01	1.35E-01	2.05E-01	2.15E-01	2.33E-01	1.95E-01
	(-3.72E-10)	-4.97E-10	-1.57E-10	(-2.97E-12)	-1.11E-10	-6.79E-11	(-7.58E-13)	-7.71E-11	-9.64E-11	-1.71E-11	-1.43E-11
	-2.96E-10*	-4.65E-10*	-1.52E-10*	-5.17E-12*	-1.17E-10*	-7.11E-11*	-6.50E-13*	-7.64E-11*	-9.66E-11*	-1.78E-11*	-1.38E-11*
1	-.7981	-.7197	-.6565	-.6045	-.5609	-.5239	-.4921	-.4645	-.4404	-.4191	-.4001
	-12529.2	-13894.1	-15232.2	-16543.7	-17828.7	-19087.4	-20320.0	-21526.5	-22707.1	-23862.0	-24991.1
	8.32E-15	6.39E-15	2.85E-15	7.38E-16	2.02E-17	5.15E-17	4.50E-17	2.43E-20	2.54E-17	2.64E-17	7.45E-19
	1.3186	1.0968	1.0415	.9941	.3451	1.5566	1.3845	1.7536	1.3159	1.3513	2.0731
	1.92E-01	2.48E-01	2.56E-01	2.62E-01	1.50E-01	1.20E-01	1.72E-01	6.91E-02	1.93E-01	1.82E-01	2.09E-02
	(-1.23E-09)	(-2.13E-09)	(-1.34E-09)	-4.64E-10	(-5.26E-12)	(-1.04E-11)	(-2.27E-11)	(-2.34E-15)	-2.25E-11	-2.42E-11	(-1.02E-14)
	-3.08E-10*	-1.53E-09*	-1.22E-09*	-4.44E-10*	-3.06E-11*	-1.97E-11*	-2.98E-11*	-1.34E-13*	-2.22E-11*	-2.65E-11*	-9.35E-14*
2	-.9077	-.8076	-.7289	-.6653	-.6129	-.5690	-.5317	-.4996	-.4718	-.4474	-.4259
	-11017.2	-12382.0	-13720.1	-15031.7	-16316.7	-17575.4	-18807.9	-20014.4	-21195.0	-22349.9	-23479.1
	2.65E-13	4.02E-14	3.29E-14	1.22E-14	3.21E-15	3.92E-16	1.84E-19	3.37E-17	4.00E-17	4.52E-17	8.51E-17
	1.6888	1.3113	1.1059	1.0055	.9294	.7070	-11.1370	1.5052	1.0964	.8822	.8671
	8.41E-02	1.95E-01	2.46E-01	2.61E-01	2.66E-01	2.48E-01	0.00E+00	1.35E-01	2.48E-01	2.66E-01	2.65E-01
	(-5.09E-09)	(-5.85E-09)	(-1.04E-08)	(-5.72E-09)	-1.99E-09	(-2.66E-10)	(0.00E+00)	(-9.99E-12)	(-4.73E-11)	(-7.23E-11)	(-1.57E-10)
	-2.95E-10*	-1.38E-09*	-6.79E-09*	-5.08E-09*	-2.01E-09*	-3.98E-10*	-1.05E-11*	-2.17E-11*	-5.52E-11*	-9.11E-11*	-1.91E-10*
3	-1.0495	-.9180	-.8176	-.7384	-.6744	-.6216	-.5774	-.5398	-.5075	-.4794	-.4547
	-9528.4	-10893.3	-12231.4	-13542.9	-14827.9	-16086.6	-17319.2	-18525.7	-19706.3	-20861.2	-21990.3
	3.13E-11	1.40E-12	1.38E-13	1.34E-13	4.21E-14	9.85E-15	1.80E-15	9.08E-17	2.64E-16	1.45E-15	2.77E-15
	2.7026	1.8185	1.2876	1.1181	.9719	.8602	.7754	.5457	1.1498	1.0746	1.0548
	6.52E-04	5.59E-02	2.01E-01	2.44E-01	2.63E-01	2.65E-01	2.58E-01	2.11E-01	2.37E-01	2.51E-01	2.54E-01
	(-2.33E-11)	(-1.15E-08)	(-2.07E-08)	(-4.00E-08)	(-1.93E-08)	-5.84E-09	(-1.27E-09)	(-5.20E-11)	(-2.30E-10)	-1.68E-09	-3.87E-09
	-7.44E-06*	-4.38E-09*	-5.20E-09*	-2.41E-08*	-1.69E-08*	-6.39E-09*	-1.56E-09*	-8.86E-11*	-2.89E-10*	-1.74E-09*	-3.86E-09*
4	-1.2403	-1.0607	-.9289	-.8280	-.7484	-.6839	-.6308	-.5862	-.5482	-.5156	-.4872
	-8062.7	-9427.6	-10765.7	-12077.2	-13362.3	-14621.0	-15853.5	-17060.0	-18240.6	-19395.5	-20524.6
	6.67E-09	5.85E-11	5.75E-12	2.86E-13	3.97E-13	1.25E-13	2.78E-14	3.01E-15	7.74E-16	9.36E-15	2.10E-14
	.9251	3.1882	1.9389	1.2246	1.1284	.9723	.8672	.7588	1.2849	1.0941	1.0743
	2.66E-01	1.65E-05	3.61E-02	2.19E-01	2.42E-01	2.63E-01	2.65E-01	2.56E-01	2.02E-01	2.48E-01	2.51E-01
	(-5.00E-04)	(-2.71E-14)	(-1.90E-08)	(-4.89E-08)	(-1.12E-07)	(-5.51E-08)	-1.58E-08	(-1.99E-09)	(-3.89E-10)	-8.52E-09	-2.33E-08
	-6.10E-04*	-2.97E-05*	-1.02E-07*	-1.26E-08*	-6.09E-08*	-4.53E-08*	-1.63E-08*	-2.29E-09*	-6.44E-10*	-8.92E-09*	-2.33E-08*
5	-1.5106	-1.2524	-1.0726	-.9403	-.8390	-.7588	-.6939	-.6403	-.5953	-.5570	-.5241
	-6619.8	-7984.7	-9322.8	-10634.3	-11919.4	-13178.1	-14410.6	-15617.1	-16797.7	-17952.6	-19081.7
	9.23E-07	2.19E-08	7.01E-11	1.94E-11	3.53E-13	9.36E-13	2.81E-13	3.53E-14	1.43E-15	4.03E-14	9.79E-14
	1.8817	1.0713	4.2019	2.0545	1.0627	1.1507	.9896	.8134	1.7442	1.1191	1.0722
	4.47E-02	2.52E-01	4.63E-10	2.26E-02	2.53E-01	2.37E-01	2.62E-01	2.62E-01	7.12E-02	2.43E-01	2.52E-01
	(-1.09E-03)	-1.44E-03	(-2.47E-23)	(-2.41E-08)	(-7.78E-08)	(-2.43E-07)	(-1.17E-07)	-1.88E-08	(-6.95E-11)	-2.80E-08	-8.73E-08
	-2.54E-04*	-1.32E-03*	-9.70E-05*	-7.97E-07*	-2.46E-08*	-1.14E-07*	-8.45E-08*	-1.87E-08*	-6.28E-10*	-2.98E-08*	-8.83E-08*
6	-1.9233	-1.5234	-1.2654	-1.0853	-.9525	-.8505	-.7698	-.7044	-.6503	-.6049	-.5662
	-5199.5	-6564.3	-7902.5	-9214.0	-10499.0	-11757.7	-12990.2	-14196.7	-15377.3	-16532.2	-17661.4
	1.82E-05	1.58E-06	6.17E-08	3.22E-11	5.58E-11	8.27E-14	1.51E-12	3.49E-13	5.92E-16	1.23E-13	3.65E-13
	.9056	1.9606	1.1888	7.9958	2.1710	.0002	1.1879	1.0057	-1.4622	1.1520	1.0717
	2.66E-01	3.32E-02	2.28E-01	9.36E-42	1.34E-02	5.95E-02	2.28E-01	2.61E-01	8.74E-06	2.37E-01	2.52E-01
	(-3.67E-01)	(-9.97E-04)	(-3.20E-03)	(0.00E+00)	(-2.35E-08)	(-9.63E-10)	(-3.50E-07)	(-1.37E-07)	(-3.33E-19)	(-6.29E-08)	-2.58E-07
	-4.42E-01*	-1.96E-03*	-2.48E-03*	-2.71E-04*	-4.01E-06*	-3.24E-08*	-1.19E-07*	-7.19E-08*	-1.28E-10*	-7.10E-08*	-2.65E-07*
7	-2.6307	-1.9357	-1.5374	-1.2795	-1.0988	-.9653	-.8627	-.7813	-.7153	-.6608	-.6149
	-3801.3	-5166.2	-6504.3	-7815.8	-9100.8	-10359.5	-11592.0	-12798.6	-13979.2	-15134.1	-16263.2
	2.15E-03	4.08E-05	2.40E-06	1.53E-07	1.36E-11	1.41E-10	7.94E-13	1.27E-12	1.19E-13	2.57E-13	1.18E-12
	1.9516	1.0555	2.0566	1.2884	-13.7450	2.2879	2.2527	1.2791	1.1032	1.1641	1.0785
	3.44E-02	2.54E-01	2.24E-02	2.01E-01	0.00E+00	7.54E-03	9.01E-03	2.04E-01	2.46E-01	2.34E-01	2.51E-01
	(-2.83E-01)	-7.37E-01	(-6.71E-04)	(-5.99E-03)	(0.00E+00)	(-1.81E-08)	(-2.03E-10)	(-2.25E-07)	(-3.99E-08)	(-9.86E-08)	-6.44E-07
	-6.03E-04*	-6.91E-01*	-7.86E-03*	-4.07E-03*	-6.67E-04*	-1.53E-05*	-1.52E-08*	-1.61E-08*	-1.48E-10*	-1.44E-07*	-6.77E-07*

Table 8. Radiative transition parameters for N_2 $w\ ^1\Delta_u$–$a\ ^1\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
8	.6951	.7861	.9023	1.0558	1.2677	1.5791	2.0812	3.0262	5.4606	25.9469	-9.6771
	14387.0	12720.7	11082.2	9471.4	7888.3	6332.9	4804.9	3304.4	1831.3	385.4	-1033.4
	5.82E-06	1.63E-04	1.99E-03	1.36E-02	5.40E-02	1.16E-01	9.69E-02	8.09E-04	1.28E-01	8.77E-02	3.92E-01
	.9631	.9895	1.0193	1.0526	1.0900	1.1330	1.1876	1.5145	1.2679	1.4321	1.4746
	2.64E-01	2.62E-01	2.59E-01	2.55E-01	2.49E-01	2.41E-01	2.28E-01	1.32E-01	2.07E-01	1.58E-01	1.44E-01
	2.45E+00	4.66E+01	3.69E+02	1.52E+03	3.32E+03	3.45E+03	1.13E+03	(1.03E+00)	6.84E+01	2.53E-01	-1.83E+01
	2.53E+00*	4.81E+01*	3.79E+02*	1.55E+03	3.37E+03	3.46E+03	1.12E+03	6.49E-01*	6.86E+01	2.48E-01	-1.85E+01
9	.6353	.7105	.8041	.9237	1.0819	1.3008	1.6235	2.1464	3.1389	5.7475	31.1413
	15741.5	14075.2	12436.7	10825.9	9242.8	7687.4	6159.4	4658.9	3185.8	1739.9	321.1
	1.36E-06	4.11E-05	5.64E-04	4.50E-03	2.24E-02	6.81E-02	1.13E-01	6.51E-02	2.17E-03	1.38E-01	5.48E-02
	.9462	.9688	.9952	1.0251	1.0585	1.0961	1.1399	1.1989	1.0484	1.2769	1.4679
	2.65E-01	2.64E-01	2.62E-01	2.58E-01	2.54E-01	2.48E-01	2.39E-01	2.25E-01	2.55E-01	2.05E-01	1.46E-01
	7.53E-01	1.61E+01	1.50E+02	7.73E+02	2.31E+03	3.85E+03	3.05E+03	6.78E+02	(9.25E+00)	6.16E+01	7.89E-02
	7.79E-01*	1.67E+01*	1.55E+02*	7.94E+02*	2.35E+03	3.89E+03	3.05E+03	6.60E+02	1.18E+01*	6.15E+01	7.75E-02
10	.5857	.6490	.7262	.8224	.9455	1.1086	1.3347	1.6689	2.2129	3.2542	6.0453
	17074.6	15408.3	13769.7	12159.0	10575.9	9020.4	7492.5	5992.0	4518.9	3073.0	1654.2
	3.38E-07	1.08E-05	1.60E-04	1.44E-03	8.41E-03	3.24E-02	7.85E-02	1.02E-01	3.83E-02	1.21E-02	1.38E-01
	.9334	.9517	.9745	1.0010	1.0309	1.0644	1.1023	1.1473	1.2136	1.1579	1.2852
	2.65E-01	2.65E-01	2.63E-01	2.61E-01	2.58E-01	2.53E-01	2.47E-01	2.38E-01	2.22E-01	2.35E-01	2.02E-01
	2.40E-01	5.59E+00	5.87E+01	3.57E+02	1.34E+03	3.09E+03	4.07E+03	2.51E+03	3.52E+02	3.93E+01	5.19E+01
	2.47E-01*	5.77E+00*	6.07E+01*	3.67E+02*	1.37E+03*	3.14E+03	4.10E+03	2.49E+03	3.38E+02	4.28E+01	5.15E+01
11	.5439	.5981	.6631	.7423	.8412	.9678	1.1358	1.3691	1.7150	2.2806	3.3714
	18386.5	16720.2	15081.7	13470.9	11887.8	10332.4	8804.4	7303.9	5830.8	4384.9	2966.1
	9.04E-08	2.96E-06	4.66E-05	4.55E-04	3.00E-03	1.37E-02	4.26E-02	8.39E-02	8.58E-02	1.84E-02	2.62E-02
	.9251	.9385	.9572	.9802	1.0068	1.0368	1.0704	1.1087	1.1552	1.2362	1.1883
	2.66E-01	2.65E-01	2.64E-01	2.63E-01	2.60E-01	2.57E-01	2.52E-01	2.45E-01	2.36E-01	2.16E-01	2.28E-01
	8.04E-02	1.97E+00	2.26E+01	1.56E+02	6.93E+02	2.02E+03	3.74E+03	3.99E+03	1.92E+03	1.46E+02	7.21E+01
	8.24E-02*	2.03E+00*	2.34E+01*	1.61E+02*	7.12E+02*	2.07E+03	3.80E+03	4.01E+03	1.89E+03	1.37E+02	7.57E+01
12	.5082	.5552	.6108	.6774	.7588	.8603	.9905	1.1635	1.4041	1.7618	2.3490
	19677.6	18011.2	16372.7	14762.0	13178.9	11623.4	10095.5	8595.0	7121.8	5675.9	4257.2
	2.63E-08	8.67E-07	1.41E-05	1.46E-04	1.05E-03	5.42E-03	2.01E-02	5.17E-02	8.42E-02	6.72E-02	6.03E-03
	.9212	.9295	.9437	.9628	.9859	1.0126	1.0426	1.0764	1.1153	1.1641	1.2830
	2.66E-01	2.66E-01	2.65E-01	2.64E-01	2.62E-01	2.60E-01	2.56E-01	2.51E-01	2.44E-01	2.34E-01	2.03E-01
	2.87E-02	7.24E-01	8.79E+00	6.62E+01	3.35E+02	1.16E+03	2.75E+03	4.19E+03	3.67E+03	1.36E+03	(3.88E+01)
	2.92E-02*	7.43E-01*	9.06E+00*	6.83E+01*	3.45E+02*	1.20E+03*	2.81E+03	4.25E+03	3.68E+03	1.34E+03	3.45E+01*
13	.4774	.5186	.5668	.6237	.6921	.7756	.8798	1.0136	1.1916	1.4396	1.8091
	20948.0	19281.7	17643.2	16032.4	14449.3	12893.9	11365.9	9865.4	8392.3	6946.4	5527.6
	8.39E-09	2.73E-07	4.48E-06	4.80E-05	3.67E-04	2.08E-03	8.77E-03	2.71E-02	5.87E-02	7.96E-02	4.87E-02
	.9211	.9248	.9342	.9489	.9683	.9917	1.0184	1.0485	1.0825	1.1222	1.1744
	2.66E-01	2.66E-01	2.65E-01	2.65E-01	2.64E-01	2.62E-01	2.59E-01	2.55E-01	2.50E-01	2.43E-01	2.31E-01
	1.10E-02	2.80E-01	3.51E+00	2.81E+01	1.56E+02	6.20E+02	1.75E+03	3.44E+03	4.40E+03	3.19E+03	8.92E+02
	1.12E-02*	2.86E-01*	3.61E+00*	2.89E+01*	1.61E+02*	6.37E+02*	1.80E+03*	3.51E+03	4.44E+03	3.18E+03	8.68E+02
14	.4505	.4870	.5293	.5786	.6370	.7070	.7926	.8996	1.0371	1.2200	1.4754
	22198.2	20531.8	18893.3	17282.5	15699.5	14144.0	12616.1	11115.6	9642.4	8196.5	6777.8
	2.93E-09	9.34E-08	1.52E-06	1.65E-05	1.31E-04	7.92E-04	3.67E-03	1.30E-02	3.41E-02	6.30E-02	7.12E-02
	.9240	.9238	.9286	.9389	.9542	.9740	.9974	1.0242	1.0545	1.0888	1.1295
	2.66E-01	2.66E-01	2.66E-01	2.65E-01	2.65E-01	2.63E-01	2.61E-01	2.59E-01	2.55E-01	2.49E-01	2.41E-01
	4.59E-03	1.16E-01	1.47E+00	1.22E+01	7.20E+01	3.15E+02	1.02E+03	2.41E+03	4.02E+03	4.36E+03	2.62E+03
	4.61E-03*	1.17E-01*	1.50E+00*	1.25E+01*	7.42E+01*	3.24E+02*	1.05E+03*	2.47E+03	4.08E+03	4.39E+03	2.60E+03
15	.4268	.4595	.4969	.5402	.5907	.6504	.7222	.8100	.9198	1.0608	1.2488
	23428.2	21761.9	20123.4	18512.6	16929.5	15374.0	13846.1	12345.6	10872.5	9426.6	8007.8
	1.12E-09	3.47E-08	5.54E-07	6.01E-06	4.86E-05	3.06E-04	1.51E-03	5.90E-03	1.78E-02	4.04E-02	6.41E-02
	.9288	.9257	.9266	.9326	.9437	.9596	.9796	1.0032	1.0301	1.0605	1.0952
	2.66E-01	2.66E-01	2.66E-01	2.65E-01	2.65E-01	2.64E-01	2.63E-01	2.61E-01	2.58E-01	2.54E-01	2.48E-01
	2.06E-03	5.11E-02	6.46E-01	5.44E+00	3.36E+01	1.57E+02	5.63E+02	1.53E+03	3.09E+03	4.41E+03	4.10E+03
	2.06E-03*	5.15E-02*	6.55E-01*	5.56E+00*	3.45E+01*	1.62E+02*	5.79E+02*	1.57E+03*	3.15E+03	4.48E+03	4.11E+03

Table 8. Radiative transition parameters for N_2 $w\ ^1\Delta_u$–$a\ ^1\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
8	-4.1235	-2.6385	-1.9500	-1.5529	-1.2946	-1.1132	-.9789	-.8755	-.7935	-.7269	-.6717
	-2425.1	-3790.0	-5128.1	-6439.6	-7724.7	-8983.4	-10215.9	-11422.4	-12603.0	-13757.9	-14887.0
	1.06E-01	2.49E-03	8.21E-05	3.24E-06	3.41E-07	5.80E-10	3.16E-10	1.31E-11	3.95E-14	3.47E-13	3.14E-12
	1.6041	2.0005	1.1705	2.1802	1.3764	-1.8714	2.4129	1.7809	2.7810	.8241	1.0572
	1.06E-01	2.83E-02	2.32E-01	1.28E-02	1.75E-01	1.79E-07	3.85E-03	6.33E-02	3.82E-04	2.63E-01	2.54E-01
	-3.47E+01	(-2.20E-01)	(-1.21E+00)	(-2.88E-04)	(-9.74E-03)	(-2.74E-17)	(-1.01E-08)	(-1.59E-07)	(-2.34E-14)	(-1.27E-07)	(-1.35E-06)
	-3.39E+01	-6.09E-02*	-1.00E+00*	-2.33E-02*	-5.86E-03*	-1.46E-03*	-4.82E-05*	-3.69E-09*	-2.61E-07*	-4.98E-07*	-1.62E-06*
9	-9.3402	-4.1059	-2.6500	-1.9665	-1.5698	-1.3108	-1.1285	-.9933	-.8890	-.8062	-.7390
	-1070.6	-2435.5	-3773.6	-5085.1	-6370.2	-7628.9	-8861.4	-10067.9	-11248.5	-12403.4	-13532.6
	4.04E-01	1.24E-01	2.71E-03	1.52E-04	3.83E-06	6.94E-07	3.78E-09	6.21E-10	7.98E-11	5.65E-12	7.90E-12
	1.4861	1.6169	2.0597	1.2633	2.3516	1.4579	-.3022	2.5607	1.6724	.9060	.9222
	1.41E-01	1.03E-01	2.21E-02	2.08E-01	5.39E-03	1.50E-01	1.83E-02	1.62E-03	8.82E-02	2.66E-01	2.66E-01
	-2.00E+01	-3.84E+01	(-1.44E-01)	(-1.76E+00)	(-5.84E-05)	(-1.40E-02)	(-1.80E-06)	(-3.36E-09)	(-1.79E-06)	(-1.55E-06)	(-2.80E-06)
	-2.02E+01	-3.74E+01	-2.80E-01*	-1.37E+00*	-5.73E-02*	-7.29E-03*	-2.89E-03*	-1.31E-04*	-1.94E-07*	-3.47E-06*	-4.92E-06*
10	38.1060	-9.0707	-4.0974	-2.6652	-1.9853	-1.5884	-1.3283	-1.1448	-1.0085	-.9033	-.8197
	262.4	-1102.4	-2440.6	-3752.1	-5037.1	-6295.8	-7528.3	-8734.8	-9915.5	-11070.3	-12199.5
	3.14E-02	4.13E-01	1.41E-01	2.75E-03	2.62E-04	3.85E-06	1.30E-06	1.52E-08	1.06E-09	3.28E-10	5.99E-11
	1.5209	1.4981	1.6301	2.1338	1.3413	2.6168	1.5363	.3383	2.7504	1.6310	1.0395
	1.30E-01	1.37E-01	9.92E-02	1.59E-02	1.86E-01	1.14E-03	1.26E-01	1.48E-01	4.72E-04	9.90E-02	2.57E-01
	1.96E-02	-2.11E+01	-4.10E+01	(-7.46E-02)	(-2.33E+00)	(-2.53E-06)	(-1.78E-02)	(-4.52E-04)	(-4.68E-10)	(-8.83E-06)	(-1.45E-05)
	1.91E-02	-2.14E+01	-3.99E+01	-7.56E-01*	-1.75E+00*	-1.23E-01*	-7.53E-03*	-5.18E-03*	-3.18E-04*	-1.13E-06*	-1.83E-05*
11	6.3518	47.7377	-8.8602	-4.0981	-2.6844	-2.0065	-1.6087	-1.3472	-1.1623	-1.0248	-.9185
	1574.4	209.5	-1128.6	-2440.1	-3725.2	-4983.9	-6216.4	-7422.9	-8603.5	-9758.4	-10887.6
	1.31E-01	1.60E-02	4.18E-01	1.58E-01	2.61E-03	4.25E-04	3.01E-06	2.25E-06	4.77E-08	1.54E-09	1.05E-09
	1.2931	1.6079	1.5106	1.6438	2.2307	1.4092	3.1058	1.6151	.7013	3.0297	1.6175
	2.00E-01	1.05E-01	1.33E-01	9.56E-02	1.01E-02	1.65E-01	3.28E-05	1.03E-01	2.47E-01	6.04E-05	1.03E-01
	4.15E+01	3.29E-03	-2.17E+01	-4.24E+01	(-2.76E-02)	(-2.89E+00)	(-1.57E-09)	(-1.99E-02)	(-3.76E-03)	(-1.05E-11)	(-2.91E-05)
	4.10E+01	3.12E-03	-2.21E+01	-4.13E+01	-1.60E+00*	-2.11E+00*	-2.39E-01*	-5.84E-03*	-8.44E-03*	-6.95E-04*	-3.54E-06*
12	3.4899	6.6643	61.5707	-8.7025	-4.1083	-2.7080	-2.0303	-1.6308	-1.3675	-1.1810	-1.0420
	2865.4	1500.5	162.4	-1149.1	-2434.1	-3692.8	-4925.3	-6131.8	-7312.5	-8467.4	-9596.5
	4.11E-02	1.20E-01	6.63E-03	4.21E-01	1.73E-01	2.26E-03	6.56E-04	1.40E-06	3.62E-06	1.27E-07	1.71E-09
	1.2049	1.3007	1.7750	1.5237	1.6580	2.3655	1.4700	4.3941	1.6977	.9457	3.5372
	2.24E-01	1.98E-01	6.45E-02	1.30E-01	9.19E-02	5.00E-03	1.46E-01	4.13E-11	8.20E-02	2.65E-01	6.87E-07
	9.84E+01	3.20E+01	(2.40E-04)	-2.17E+01	-4.27E+01	(-5.76E-03)	(-3.38E+00)	(-1.12E-21)	(-1.93E-02)	(-1.10E-02)	(-1.45E-15)
	1.02E+02	3.14E+01	1.59E-04*	-2.22E+01	-4.15E+01	-2.90E+00*	-2.40E+00*	-4.27E-01*	-2.43E-03*	-1.25E-02*	-1.39E-03*
13	2.4179	3.6088	6.9790	82.3968	-8.5936	-4.1282	-2.7361	-2.0570	-1.6551	-1.3895	-1.2011
	4135.9	2771.0	1432.9	121.4	-1163.7	-2422.4	-3654.9	-4861.4	-6042.0	-7196.9	-8326.0
	5.49E-04	5.46E-02	1.05E-01	1.83E-03	4.23E-01	1.87E-01	1.73E-03	9.64E-04	4.57E-08	5.38E-06	3.00E-07
	1.5120	1.2166	1.3082	2.2061	1.5373	1.6727	2.5704	1.5262	20.6440	1.7885	1.1295
	1.33E-01	2.21E-01	1.95E-01	1.13E-02	1.25E-01	8.81E-02	1.52E-03	1.29E-01	0.00E+00	6.17E-02	2.41E-01
	(1.39E+00)	1.15E+02	2.39E+01	(8.50E-07)	-2.13E+01	-4.18E+01	(-3.99E-04)	(-3.72E+00)	(0.00E+00)	(-1.55E-02)	(-2.04E-02)
	8.27E-01*	1.17E+02	2.33E+01	3.74E-05*	-2.19E+01	-4.06E+01	-4.75E+00*	-2.56E+00*	-7.08E-01*	-6.45E-11*	-1.66E-02*
14	1.8567	2.4869	3.7272	7.2914	115.6524	-8.5307	-4.1584	-2.7691	-2.0869	-1.6816	-1.4132
	5386.0	4021.1	2683.0	1371.5	86.5	-1172.2	-2404.8	-3611.3	-4791.9	-5946.8	-7075.9
	3.20E-02	6.74E-04	6.53E-02	8.90E-02	1.03E-04	4.25E-01	1.99E-01	1.11E-03	1.35E-03	1.66E-06	7.36E-06
	1.1872	.9086	1.2259	1.3154	5.1641	1.5515	1.6881	2.9285	1.5794	-2.1756	1.8941
	2.28E-01	2.66E-01	2.19E-01	1.93E-01	6.55E-16	1.21E-01	8.43E-02	1.31E-04	1.13E-01	6.68E-09	4.27E-02
	5.29E+02	(6.28E+00)	1.22E+02	1.74E+01	(5.78E-35)	-2.04E+01	-3.99E+01	(-1.82E-06)	(-3.87E+00)	(-3.15E-17)	(-9.65E-03)
	5.09E+02	1.01E+01*	1.24E+02	1.68E+01	1.21E-04*	-2.12E+01	-3.86E+01	-7.20E+00*	-2.54E+00*	-1.10E+00*	-5.92E-03*
15	1.5115	1.9043	2.5556	3.8439	7.5958	172.9475	-8.5128	-4.1996	-2.8075	-2.1201	-1.7106
	6616.0	5251.2	3913.0	2601.5	1316.5	57.8	-1174.7	-2381.2	-3561.8	-4716.7	-5845.9
	6.02E-02	1.85E-02	4.87E-03	7.25E-02	7.33E-02	2.74E-04	4.29E-01	2.09E-01	4.92E-04	1.82E-03	1.18E-05
	1.1374	1.2049	1.0952	1.2339	1.3223	-1.1354	1.5662	1.7041	3.7446	1.6312	-.0402
	2.40E-01	2.24E-01	2.48E-01	2.16E-01	1.91E-01	1.25E-04	1.17E-01	8.04E-02	8.39E-08	9.89E-02	5.18E-02
	2.03E+03	2.72E+02	(3.63E+01)	1.21E+02	1.24E+01	(1.67E-12)	-1.93E+01	-3.70E+01	(-3.17E-13)	(-3.80E+00)	(-1.28E-02)
	2.01E+03	2.57E+02	4.16E+01*	1.22E+02	1.19E+01	8.75E-05*	-2.02E+01	-3.58E+01	-1.02E+01*	-2.32E+00*	-1.62E+00*

Table 9. Radiative transition parameters for N_2 $C\ ^3\Pi_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.3370	.3576	.3804	.4058	.4343	.4665	.5032	.5452	.5938	.6507	.7181
	29671.2	27965.8	26289.6	24642.3	23024.0	21434.7	19874.5	18343.4	16841.6	15369.2	13926.3
	4.54E-01	3.27E-01	1.45E-01	5.12E-02	1.58E-02	4.50E-03	1.22E-03	3.23E-04	8.44E-05	2.20E-05	5.71E-06
	1.1843	1.1466	1.1135	1.0830	1.0545	1.0277	1.0025	.9788	.9568	.9359	.9150
	7.40E-01	7.81E-01	8.12E-01	8.37E-01	8.56E-01	8.70E-01	8.79E-01	8.85E-01	8.87E-01	8.86E-01	8.83E-01
	1.32E+07	8.84E+06	3.53E+06	1.09E+06	2.86E+05	6.78E+04	1.50E+04	3.16E+03	6.42E+02	1.27E+02	2.44E+01
	1.31E+07	8.84E+06	3.56E+06	1.10E+06	2.92E+05	6.98E+04*	1.55E+04*	3.29E+03*	6.74E+02*	1.34E+02*	2.59E+01*
1	.3158	.3338	.3536	.3754	.3997	.4268	.4573	.4917	.5309	.5759	.6281
	31665.6	29960.2	28284.0	26636.7	25018.4	23429.1	21868.9	20337.8	18836.0	17363.6	15920.7
	3.92E-01	2.26E-02	2.05E-01	1.98E-01	1.10E-01	4.68E-02	1.71E-02	5.68E-03	1.78E-03	5.36E-04	1.59E-04
	1.2285	1.2098	1.1550	1.1211	1.0904	1.0619	1.0354	1.0103	.9864	.9639	.9428
	6.87E-01	7.10E-01	7.72E-01	8.05E-01	8.31E-01	8.51E-01	8.66E-01	8.76E-01	8.83E-01	8.86E-01	8.87E-01
	1.19E+07	6.19E+05	5.60E+06	4.93E+06	2.41E+06	8.84E+05	2.72E+05	7.44E+04	1.88E+04	4.47E+03	1.02E+03
	1.19E+07	5.87E+05	5.54E+06	4.93E+06	2.43E+06	8.98E+05	2.78E+05	7.68E+04*	1.95E+04*	4.68E+03*	1.07E+03*
2	.2976	.3135	.3309	.3499	.3709	.3942	.4200	.4489	.4813	.5180	.5599
	33606.3	31901.0	30224.8	28577.5	26959.2	25369.9	23809.7	22278.6	20776.8	19304.3	17861.5
	1.33E-01	3.42E-01	2.36E-02	6.42E-02	1.61E-01	1.39E-01	7.91E-02	3.62E-02	1.44E-02	5.28E-03	1.82E-03
	1.2784	1.2395	1.1679	1.1652	1.1288	1.0976	1.0689	1.0424	1.0177	.9940	.9711
	6.21E-01	6.73E-01	7.58E-01	7.61E-01	7.98E-01	8.25E-01	8.47E-01	8.62E-01	8.74E-01	8.81E-01	8.86E-01
	3.94E+06	1.02E+07	7.58E+05	1.76E+06	4.07E+06	3.13E+06	1.55E+06	6.02E+05	2.00E+05	5.97E+04	1.65E+04
	3.97E+06	1.01E+07	7.99E+05	1.71E+06	4.04E+06	3.14E+06	1.57E+06	6.14E+05	2.06E+05	6.19E+04*	1.72E+04*
3	.2818	.2961	.3115	.3284	.3468	.3671	.3894	.4140	.4415	.4722	.5067
	35480.4	33775.1	32098.8	30451.5	28833.2	27243.9	25683.7	24152.6	22650.8	21178.4	19735.5
	2.02E-02	2.53E-01	2.11E-01	8.90E-02	5.00E-03	9.36E-02	1.31E-01	9.87E-02	5.53E-02	2.61E-02	1.10E-02
	1.3415	1.2894	1.2551	1.2835	1.1893	1.1362	1.1047	1.0755	1.0487	1.0243	1.0012
	5.35E-01	6.07E-01	6.52E-01	7.41E-01	7.34E-01	7.91E-01	8.20E-01	8.42E-01	8.59E-01	8.71E-01	8.79E-01
	5.23E+05	7.25E+06	6.01E+06	2.79E+06	(1.31E+05)	2.40E+06	3.02E+06	2.00E+06	9.61E+05	3.82E+05	1.33E+05
	5.28E+05	7.30E+06	5.94E+06	2.85E+06	1.15E+05*	2.35E+06	3.00E+06	2.01E+06	9.76E+05	3.91E+05	1.37E+05
4	.2684	.2812	.2952	.3102	.3266	.3445	.3641	.3856	.4093	.4355	.4648
	37261.7	35556.3	33880.1	32232.8	30614.5	29025.2	27465.0	25933.9	24432.1	22959.7	21516.8
	9.50E-04	5.37E-02	3.30E-01	1.19E-01	1.16E-01	3.48E-03	4.02E-02	1.01E-01	1.01E-01	6.80E-02	3.72E-02
	1.4568	1.3575	1.3027	1.2802	1.1862	1.1370	1.1423	1.1110	1.0818	1.0543	1.0295
	3.80E-01	5.13E-01	5.88E-01	6.19E-01	7.38E-01	7.90E-01	7.85E-01	8.14E-01	8.38E-01	8.56E-01	8.69E-01
	1.44E+04	1.29E+06	8.99E+06	3.09E+06	3.66E+06	(1.08E+05)	1.04E+06	2.37E+06	2.09E+06	1.22E+06	5.66E+05
	1.38E+04*	1.30E+06	9.03E+06	3.02E+06	3.71E+06	1.24E+05*	9.98E+05	2.33E+06	2.09E+06	1.23E+06	5.78E+05

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 9. Radiative transition parameters for N_2 $C\ ^3\Pi_u$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi^*_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
0	.7992	.8985	1.0228	1.1828	1.3962	1.6944	2.1403	2.8779	4.3302	8.4991	129.9646
	12513.1	11129.9	9776.8	8454.2	7162.4	5901.6	4672.3	3474.7	2309.3	1176.6	76.9
	1.46E-06	3.68E-07	8.99E-08	2.11E-08	4.65E-09	9.03E-10	1.19E-10	7.67E-13	2.08E-11	5.49E-11	7.33E-11
	.8925	.8670	.8369	.8004	.7541	.6853	.5188	-2.3476	1.3805	1.1507	1.0892
	8.77E-01	8.67E-01	8.50E-01	8.24E-01	7.81E-01	7.04E-01	4.80E-01	2.31E-16	4.81E-01	7.77E-01	8.32E-01
	4.47E+00	7.73E-01	(1.23E-01)	(1.75E-02)	(2.12E-03)	(1.86E-04)	(5.65E-06)	(3.48E-39)	(1.20E-07)	(1.09E-07)	(4.69E-11)
	4.80E+00*	8.44E-01*	1.38E-01*	2.06E-02*	2.67E-03*	2.71E-04*	1.49E-05*	1.14E-09*	5.27E-07*	1.54E-07*	5.42E-11*
1	.6893	.7619	.8495	.9571	1.0921	1.2665	1.5000	1.8285	2.3236	3.1536	4.8278
	14507.5	13124.3	11771.2	10448.6	9156.8	7896.0	6666.7	5469.1	4303.7	3171.0	2071.3
	4.62E-05	1.33E-05	3.74E-06	1.02E-06	2.63E-07	6.18E-08	1.19E-08	1.38E-09	2.11E-12	2.39E-10	5.17E-10
	.9224	.9013	.8782	.8515	.8176	.7675	.6761	.4290	-7.5517	1.4627	1.1828
	8.85E-01	8.80E-01	8.72E-01	8.59E-01	8.37E-01	7.95E-01	6.92E-01	3.62E-01	0.00E+00	3.73E-01	7.42E-01
	2.24E+02	4.71E+01	9.39E+00	1.74E+00	(2.87E-01)	(3.89E-02)	(3.42E-03)	(6.00E-05)	(0.00E+00)	(2.14E-06)	(5.12E-06)
	2.37E+02*	5.03E+01*	1.02E+01*	1.92E+00*	3.29E-01*	4.85E-02*	5.42E-03*	3.13E-04*	1.60E-07*	1.59E-05*	8.44E-06*
2	.6080	.6638	.7293	.8071	.9011	1.0166	1.1618	1.3495	1.6014	1.9563	2.4924
	16448.3	15065.1	13712.0	12389.4	11097.6	9836.8	8607.5	7409.9	6244.5	5111.8	4012.1
	6.03E-04	1.96E-04	6.21E-05	1.91E-05	5.70E-06	1.61E-06	4.21E-07	9.26E-08	1.33E-08	2.81E-10	8.61E-10
	.9497	.9295	.9092	.8866	.8604	.8288	.7860	.7107	.5141	-1.1337	1.7548
	8.87E-01	8.86E-01	8.82E-01	8.75E-01	8.64E-01	8.45E-01	8.12E-01	7.34E-01	4.74E-01	5.31E-07	1.05E-01
	4.28E+03	1.06E+03	2.52E+02	5.65E+01	1.18E+01	(2.22E+00)	(3.58E-01)	(4.12E-02)	(1.48E-03)	(2.14E-17)	(1.23E-06)
	4.49E+03*	1.12E+03*	2.68E+02*	6.08E+01*	1.29E+01*	2.52E+00*	4.32E-01*	5.88E-02*	4.80E-03*	3.58E-05*	1.11E-04*
3	.5458	.5904	.6416	.7011	.7709	.8539	.9541	1.0771	1.2317	1.4315	1.6989
	18322.3	16939.1	15586.1	14263.5	12971.6	11710.8	10481.5	9283.9	8118.6	6985.8	5886.2
	4.30E-03	1.58E-03	5.64E-04	1.96E-04	6.62E-05	2.14E-05	6.51E-06	1.84E-06	4.71E-07	9.77E-08	1.09E-08
	.9785	.9562	.9355	.9161	.8955	.8701	.8367	.7939	.7359	.6319	.2939
	8.85E-01	8.87E-01	8.86E-01	8.84E-01	8.78E-01	8.68E-01	8.50E-01	8.18E-01	7.62E-01	6.35E-01	2.14E-01
	4.19E+04	1.23E+04	3.40E+03	9.00E+02	2.26E+02	5.25E+01	(1.10E+01)	(2.00E+00)	(2.97E-01)	(2.72E-02)	(2.07E-04)
	4.36E+04*	1.29E+04*	3.59E+03*	9.55E+02*	2.42E+02*	5.72E+01*	1.25E+01*	2.43E+00*	4.02E-01*	4.96E-02*	2.80E-03*
4	.4974	.5342	.5758	.6233	.6778	.7412	.8155	.9037	1.0101	1.1406	1.3042
	20103.6	18720.4	17367.3	16044.7	14752.9	13492.1	12262.8	11065.2	9899.8	8767.1	7667.4
	1.79E-02	7.80E-03	3.17E-03	1.22E-03	4.58E-04	1.68E-04	5.96E-05	2.00E-05	6.13E-06	1.69E-06	4.09E-07
	1.0071	.9855	.9632	.9409	.9201	.9012	.8810	.8530	.8099	.7459	.6554
	8.78E-01	8.83E-01	8.86E-01	8.87E-01	8.84E-01	8.80E-01	8.73E-01	8.60E-01	8.31E-01	7.73E-01	6.66E-01
	2.26E+05	8.09E+04	2.65E+04	8.05E+03	2.33E+03	6.47E+02	1.70E+02	4.06E+01	(8.33E+00)	(1.38E+00)	(1.66E-01)
	2.32E+05	8.37E+04*	2.76E+04*	8.50E+03*	2.48E+03*	6.91E+02*	1.83E+02*	4.47E+01*	9.85E+00*	1.88E+00*	2.97E-01*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 10. Radiative transition parameters for N_2 $E\ ^3\Sigma_g^+ - A\ ^3\Sigma_u^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.2173	.2243	.2316	.2392	.2472	.2555	.2643	.2734	.2830	.2930	.3035
	46019.7	44586.8	43181.6	41804.1	40454.5	39132.8	37839.2	36574.0	35337.4	34129.7	32951.4
	3.98E-03	1.72E-02	4.02E-02	6.78E-02	9.24E-02	1.08E-01	1.13E-01	1.08E-01	9.71E-02	8.24E-02	6.70E-02
	1.1969	1.1845	1.1727	1.1615	1.1508	1.1406	1.1309	1.1216	1.1127	1.1042	1.0960
	1.28E-02	1.10E-02	9.16E-03	7.52E-03	6.07E-03	4.84E-03	3.82E-03	2.99E-03	2.33E-03	1.80E-03	1.39E-03
	(1.29E+02)	3.71E+02	5.51E+02	(5.67E+02)(	4.57E+02)(	3.08E+02)(	1.82E+02)	9.64E+01	(4.71E+01)(	2.16E+01)(	9.34E+00)
	1.14E+02*	3.59E+02	5.77E+02	6.32E+02	5.28E+02	3.58E+02	2.04E+02	9.95E+01	4.22E+01	1.56E+01	4.96E+00
1	.2074	.2138	.2204	.2273	.2345	.2420	.2498	.2580	.2665	.2754	.2846
	48204.7	46771.8	45366.6	43989.1	42639.5	41317.8	40024.2	38759.0	37522.4	36314.7	35136.4
	2.67E-02	7.81E-02	1.18E-01	1.18E-01	8.55E-02	4.27E-02	1.14E-02	9.06E-05	5.64E-03	2.00E-02	3.56E-02
	1.2159	1.2027	1.1901	1.1782	1.1666	1.1553	1.1431	1.0924	1.1337	1.1221	1.1128
	1.53E-02	1.36E-02	1.18E-02	1.00E-02	8.25E-03	6.66E-03	5.13E-03	1.23E-03	4.10E-03	3.03E-03	2.33E-03
	(1.42E+03)	3.01E+03	3.11E+03	2.04E+03	9.15E+02	2.71E+02	(3.91E+01)(	1.62E-02)(	1.02E+01)(	1.79E+01)(	1.71E+01)
	1.19E+03	2.75E+03	3.07E+03	2.12E+03	9.54E+02	2.48E+02	1.73E+01	8.68E+00*	3.79E+01*	4.52E+01	3.43E+01

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 11. Radiative transition parameters for N_2 $E\ ^3\Sigma_g^+ - B\ ^3\Pi_g$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.2742	.2877	.3022	.3181	.3353	.3542	.3749	.3978	.4230	.4511	.4826
	36467.8	34762.5	33086.2	31438.9	29820.6	28231.3	26671.1	25140.0	23638.2	22165.8	20722.9
	1.43E-01	2.43E-01	2.35E-01	1.70E-01	1.03E-01	5.54E-02	2.75E-02	1.29E-02	5.77E-03	2.52E-03	1.07E-03
	1.1653	1.1431	1.1224	1.1031	1.0848	1.0675	1.0512	1.0357	1.0209	1.0069	.9934
	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03
	9.63E+01	1.42E+02	1.18E+02	7.32E+01	3.78E+01	1.73E+01	7.23E+00	2.83E+00	1.06E+00*	3.80E-01*	1.33E-01*
1	.2587	.2707	.2835	.2974	.3124	.3288	.3465	.3660	.3872	.4107	.4365
	38652.8	36947.5	35271.2	33623.9	32005.6	30416.3	28856.1	27325.0	25823.2	24350.8	22907.9
	3.11E-01	1.26E-01	7.28E-04	4.83E-02	1.16E-01	1.31E-01	1.06E-01	7.16E-02	4.27E-02	2.34E-02	1.21E-02
	1.1937	1.1683	1.1115	1.1324	1.1112	1.0924	1.0749	1.0585	1.0429	1.0282	1.0142
	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03	1.85E-03
	2.49E+02	8.80E+01	4.43E-01*	2.55E+01	5.26E+01	5.10E+01	3.54E+01	2.03E+01	1.02E+01	4.68E+00	2.01E+00

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 12. Radiative transition parameters for N_2 $E\ ^3\Sigma_g^+$–$C\ ^3\Pi_u$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4
0	1.4713	2.0824	3.4947	10.1275	-12.5965
	6796.6	4802.2	2861.4	987.4	-793.9
	7.75E-01	1.87E-01	3.20E-02	5.01E-03	7.94E-04
	1.1359	1.0720	1.0185	.9741	.9362
	4.14E-02	4.14E-02	4.14E-02	4.14E-02	4.14E-02
	1.69E+03	1.44E+02	5.20E+00	3.35E-02*	-1.38E-03*
1	1.1134	1.4312	1.9816	3.1522	7.1884
	8981.6	6987.2	5046.4	3172.4	1391.1
	2.05E-01	4.23E-01	2.72E-01	7.73E-02	1.75E-02
	1.2059	1.1460	1.0810	1.0273	.9838
	4.14E-02	4.14E-02	4.14E-02	4.14E-02	4.14E-02
	1.03E+03	1.00E+03	2.43E+02	1.71E+01	3.27E-01

*The Einstein coefficient for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 13. Radiative transition parameters for N_2 $D\ ^3\Sigma_u^+$–$B\ ^3\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.2259	.2350	.2446	.2549	.2658	.2776	.2901	.3036	.3181	.3338	.3506
	44264.1	42558.8	40882.6	39235.3	37617.0	36027.7	34467.5	32936.4	31434.6	29962.1	28519.3
	9.71E-02	1.93E-01	2.17E-01	1.83E-01	1.30E-01	8.14E-02	4.69E-02	2.55E-02	1.32E-02	6.67E-03	3.29E-03
	1.1608	1.1403	1.1215	1.1040	1.0876	1.0722	1.0576	1.0439	1.0310	1.0187	1.0071
	6.09E-01	5.69E-01	5.31E-01	4.95E-01	4.61E-01	4.29E-01	4.00E-01	3.72E-01	3.47E-01	3.24E-01	3.03E-01
	1.27E+07	1.95E+07	1.70E+07	1.10E+07	5.95E+06	2.84E+06	1.24E+06	5.11E+05	2.01E+05	7.63E+04	2.83E+04
	1.25E+07	1.94E+07	1.70E+07	1.10E+07	5.96E+06	2.84E+06	1.24E+06	5.07E+05	1.98E+05	7.46E+04*	2.74E+04*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	1.1092	1.4618	2.1284	3.8625	19.5110	-6.5328	-2.8244	-1.8127	-1.3407	-1.0677	-.8898
	9015.6	6840.7	4698.4	2589.0	512.5	-1530.7	-3540.5	-5516.6	-7458.6	-9366.2	-11239.1
	4.81E-01	3.78E-01	1.20E-01	1.95E-02	1.73E-03	7.89E-05	1.54E-06	5.96E-09	4.07E-11	1.63E-12	2.57E-14
	1.1491	1.1924	1.2406	1.2954	1.3612	1.4468	1.5782	1.9443	1.0324	1.7225	.9275
	2.55E-01	2.46E-01	2.34E-01	2.20E-01	2.02E-01	1.78E-01	1.41E-01	5.72E-02	2.75E-01	1.03E-01	2.86E-01
	4.65E+04	1.48E+04	1.38E+03	3.34E+01	1.93E-02	-3.64E-02	-5.50E-03	(-1.33E-05)	(-5.19E-06)	(-5.77E-08)	(-1.20E-08)
	4.64E+04	1.48E+04	1.39E+03	3.36E+01	1.95E-02*	-3.67E-02*	-5.42E-03*	-3.47E-06*	-6.07E-06*	-3.71E-08*	-1.54E-08*
1	.9183	1.1475	1.5216	2.2409	4.1909	29.1662	-5.9990	-2.7450	-1.7905	-1.3346	-1.0678
	10889.2	8714.3	6572.0	4462.6	2386.1	342.9	-1666.9	-3643.0	-5585.0	-7492.6	-9365.5
	3.24E-01	3.45E-02	3.41E-01	2.33E-01	5.94E-02	7.10E-03	4.01E-04	8.92E-06	3.08E-08	4.86E-10	1.26E-11
	1.1118	1.1669	1.2010	1.2484	1.3033	1.3696	1.4569	1.5946	2.0361	1.1718	1.8097
	2.63E-01	2.51E-01	2.44E-01	2.32E-01	2.18E-01	2.00E-01	1.75E-01	1.36E-01	4.31E-02	2.50E-01	8.31E-02
	5.84E+04	2.93E+03	1.17E+04	2.27E+03	7.79E+01	2.32E-02	-2.31E-01	-3.25E-02	(-4.04E-05)	-5.19E-05	(-2.90E-07)
	5.85E+04	2.87E+03	1.16E+04	2.28E+03	7.84E+01	2.34E-02*	-2.33E-01*	-3.17E-02*	-9.82E-08*	-5.41E-05*	-1.26E-07*
2	.7854	.9472	1.1883	1.5858	2.3643	4.5737	56.6248	-5.5572	-2.6728	-1.7702	-1.3294
	12732.8	10557.8	8415.6	6306.1	4229.7	2186.4	176.6	-1799.5	-3741.5	-5649.1	-7521.9
	1.33E-01	2.28E-01	1.87E-02	1.95E-01	2.95E-01	1.12E-01	1.74E-02	1.18E-03	2.91E-05	8.11E-08	2.99E-09
	1.0783	1.1203	1.1401	1.2113	1.2567	1.3113	1.3782	1.4674	1.6126	2.1725	1.2772
	2.68E-01	2.61E-01	2.57E-01	2.41E-01	2.30E-01	2.16E-01	1.98E-01	1.72E-01	1.31E-01	2.72E-02	2.25E-01
	4.02E+04	3.70E+04	1.49E+03	5.77E+03	2.40E+03	1.11E+02	7.60E-03	-8.27E-01	-1.07E-01	(-4.37E-05)	-2.61E-04
	4.04E+04	3.68E+04	1.53E+03	5.73E+03	2.40E+03	1.11E+02	7.67E-03	-8.34E-01*	-1.03E-01*	-8.56E-05*	-2.58E-04*
3	.6875	.8083	.9776	1.2316	1.6548	2.5001	5.0249	712.1493	-5.1868	-2.6072	-1.7518
	14546.3	12371.3	10229.1	8119.6	6043.2	3999.9	1990.1	14.0	-1928.0	-3835.6	-5708.4
	4.39E-02	1.97E-01	8.34E-02	1.01E-01	7.14E-02	3.00E-01	1.68E-01	3.32E-02	2.64E-03	7.01E-05	1.34E-07
	1.0480	1.0858	1.1315	1.1592	1.2258	1.2655	1.3197	1.3871	1.4785	1.6326	2.4033
	2.73E-01	2.67E-01	2.59E-01	2.53E-01	2.38E-01	2.28E-01	2.14E-01	1.95E-01	1.69E-01	1.26E-01	1.11E-02
	2.04E+04	5.40E+04	1.21E+04	6.99E+03	1.81E+03	2.02E+03	1.22E+02	7.09E-06	-2.19E+00	-2.54E-01	(-1.25E-05)
	2.06E+04	5.41E+04	1.20E+04	7.05E+03	1.78E+03	2.02E+03	1.23E+02	7.15E-06	-2.21E+00*	-2.44E-01*	-1.13E-03*
4	.6124	.7065	.8325	1.0098	1.2777	1.7291	2.6500	5.5633	-69.2094	-4.8731	-2.5478
	16329.7	14154.8	12012.5	9903.1	7826.6	5783.4	3773.6	1797.5	-144.5	-2052.1	-3925.0
	1.29E-02	1.01E-01	1.74E-01	8.57E-03	1.54E-01	9.50E-03	2.63E-01	2.18E-01	5.41E-02	4.96E-03	1.38E-04
	1.0202	1.0552	1.0939	1.1601	1.1694	1.2647	1.2752	1.3285	1.3964	1.4902	1.6551
	2.77E-01	2.72E-01	2.66E-01	2.53E-01	2.51E-01	2.28E-01	2.26E-01	2.11E-01	1.92E-01	1.66E-01	1.20E-01
	8.70E+03	4.30E+04	4.33E+04	1.08E+03	9.39E+03	1.94E+02	1.46E+03	1.15E+02	-2.45E-02	-4.77E+00	-4.87E-01
	8.78E+03	4.32E+04	4.32E+04	1.03E+03*	9.41E+03	1.84E+02*	1.45E+03	1.15E+02	-2.47E-02	-4.79E+00*	-4.62E-01*
5	.5530	.6286	.7264	.8579	1.0438	1.3268	1.8093	2.8161	6.2152	-33.4835	-4.6051
	18083.2	15908.2	13766.0	11656.5	9580.1	7536.8	5527.0	3551.0	1609.0	-298.7	-2171.5
	3.53E-03	4.04E-02	1.37E-01	1.09E-01	5.69E-03	1.53E-01	2.57E-03	2.04E-01	2.57E-01	7.91E-02	8.23E-03
	.9948	1.0273	1.0627	1.1032	1.0980	1.1789	1.1286	1.2860	1.3376	1.4060	1.5025
	2.80E-01	2.76E-01	2.71E-01	2.64E-01	2.65E-01	2.49E-01	2.59E-01	2.23E-01	2.09E-01	1.90E-01	1.62E-01
	3.32E+03	2.51E+04	5.32E+04	2.43E+04	7.12E+02	8.24E+03	(5.90E+01)	9.19E+02	9.47E+01	-3.07E-01	-8.98E+00
	3.35E+03*	2.53E+04	5.33E+04	2.41E+04	7.55E+02*	8.21E+03	6.57E+01*	9.13E+02	9.49E+01	-3.09E-01	-9.02E+00*
6	.5049	.5672	.6456	.7474	.8847	1.0799	1.3792	1.8960	3.0009	7.0187	-22.3168
	19806.6	17631.7	15489.4	13380.0	11303.5	9260.2	7250.4	5274.4	3332.4	1424.8	-448.1
	9.44E-04	1.42E-02	7.35E-02	1.39E-01	4.47E-02	4.03E-02	1.17E-01	2.87E-02	1.40E-01	2.83E-01	1.07E-01
	.9717	1.0019	1.0346	1.0706	1.1156	1.1298	1.1891	1.2030	1.2988	1.3473	1.4160
	2.82E-01	2.79E-01	2.75E-01	2.70E-01	2.62E-01	2.59E-01	2.47E-01	2.43E-01	2.19E-01	2.06E-01	1.87E-01
	1.18E+03	1.23E+04	4.19E+04	4.89E+04	8.97E+03	4.35E+03	5.48E+03	5.05E+02	5.07E+02	7.04E+01	-1.36E+00
	1.20E+03*	1.24E+04	4.21E+04	4.89E+04	8.81E+03	4.43E+03	5.43E+03	5.19E+02	5.01E+02	7.05E+01	-1.37E+00
7	.4651	.5175	.5820	.6634	.7694	.9129	1.1181	1.4352	1.9897	3.2070	8.0300
	21500.0	19325.1	17182.8	15073.4	12996.9	10953.7	8943.9	6967.8	5025.8	3118.2	1245.3
	2.52E-04	4.62E-03	3.22E-02	9.93E-02	1.11E-01	7.41E-03	7.86E-02	6.86E-02	6.58E-02	8.41E-02	2.94E-01
	.9510	.9787	1.0091	1.0421	1.0791	1.1434	1.1420	1.2012	1.2209	1.3151	1.3574
	2.84E-01	2.82E-01	2.78E-01	2.74E-01	2.68E-01	2.56E-01	2.57E-01	2.44E-01	2.39E-01	2.15E-01	2.03E-01
	4.09E+02	5.36E+03	2.56E+04	5.17E+04	3.55E+04	1.30E+03	7.50E+03	2.80E+03	9.69E+02	2.39E+02	4.77E+01
	4.15E+02*	5.42E+03*	2.59E+04	5.19E+04	3.53E+04	1.23E+03*	7.57E+03	2.75E+03	9.83E+02	2.35E+02	4.77E+01

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	-.7647	-.6721	-.6008	-.5442	-.4983	-.4603	-.4285	-.4013	-.3780	-.3578	-.3400
	-13076.8	-14879.1	-16645.3	-18375.2	-20068.0	-21723.1	-23339.9	-24917.5	-26455.3	-27952.5	-29408.6
	7.61E-17	1.70E-18	4.72E-17	6.30E-19	1.00E-16	2.41E-16	1.57E-16	1.80E-17	1.57E-17	7.02E-17	6.75E-17
	-1.2837	4.2135	1.4356	3.0535	1.0337	1.0886	1.0873	1.0171	1.2225	1.1519	1.1283
	6.17E-04	6.71E-08	1.81E-01	4.10E-04	2.75E-01	2.67E-01	2.67E-01	2.77E-01	2.39E-01	2.55E-01	2.59E-01
	(-2.62E-16)	(-1.02E-25)	(-2.90E-11)	(-2.66E-18)	-2.48E-10	-7.12E-10	-5.76E-10	-8.69E-11	-6.72E-11	-4.03E-10	-4.68E-10
	-5.40E-10*	-3.11E-13*	-4.83E-11*	-4.15E-14*	-2.37E-10*	-6.93E-10*	-5.64E-10*	-8.53E-11*	-7.10E-11*	-4.08E-10*	-4.72E-10*
1	-.8926	-.7689	-.6770	-.6060	-.5496	-.5038	-.4658	-.4340	-.4068	-.3835	-.3632
	-11203.2	-13005.5	-14771.7	-16501.6	-18194.4	-19849.5	-21466.3	-23043.9	-24581.7	-26078.9	-27535.0
	3.28E-13	1.47E-16	4.52E-16	1.06E-15	1.16E-15	9.23E-16	4.87E-16	1.33E-16	2.68E-18	3.16E-17	8.60E-17
	1.0566	-5.2039	.3229	.8980	.9546	.9754	.9758	.9411	.4251	1.2104	1.1392
	2.72E-01	9.37E-23	1.98E-01	2.87E-01	2.84E-01	2.82E-01	2.82E-01	2.85E-01	2.26E-01	2.42E-01	2.57E-01
	-1.38E-07	(0.00E+00)	(-2.31E-10)	-1.59E-09	-2.28E-09	-2.32E-09	-1.55E-09	-5.36E-10	(-8.23E-12)	(-1.33E-10)	-4.82E-10
	-1.49E-07*	-4.79E-09*	-8.38E-10*	-1.46E-09*	-2.18E-09*	-2.26E-09*	-1.51E-09*	-5.22E-10*	-1.67E-11*	-1.52E-10*	-5.04E-10*
2	-1.0684	-.8959	-.7735	-.6822	-.6116	-.5554	-.5096	-.4717	-.4398	-.4126	-.3892
	-9359.7	-11161.9	-12928.2	-14658.0	-16350.8	-18006.0	-19622.7	-21200.4	-22738.1	-24235.3	-25691.4
	4.80E-11	2.62E-12	1.69E-14	1.21E-14	1.24E-14	6.32E-15	2.72E-15	1.21E-15	4.52E-16	5.50E-17	2.87E-17
	1.9307	1.1746	-.3734	.6427	.9225	.9056	.8734	.8827	.9032	.7732	1.4509
	5.95E-02	2.50E-01	3.82E-02	2.72E-01	2.86E-01	2.87E-01	2.88E-01	2.88E-01	2.87E-01	2.86E-01	1.77E-01
	(-5.65E-07)	-9.20E-07	(-2.15E-10)	(-1.14E-08)	-1.79E-08	-1.23E-08	-6.90E-09	-3.86E-09	-1.77E-09	-2.59E-10	(-6.16E-11)
	-4.05E-08*	-8.90E-07*	-6.30E-08*	-1.79E-08*	-1.67E-08*	-1.20E-08*	-7.00E-09*	-3.83E-09*	-1.67E-09*	-2.45E-10*	-1.15E-10*
3	-1.3252	-1.0697	-.8997	-.7785	-.6879	-.6176	-.5615	-.5158	-.4779	-.4460	-.4188
	-7546.2	-9348.4	-11114.7	-12844.5	-14537.3	-16192.5	-17809.2	-19386.9	-20924.6	-22421.8	-23877.9
	1.25E-08	1.14E-10	1.44E-11	2.28E-13	6.58E-14	5.11E-14	2.62E-14	1.24E-14	5.30E-15	1.47E-15	1.01E-16
	1.3634	2.1111	1.2696	.2921	.5871	.8680	.8777	.8741	.8749	.8096	.2840
	2.02E-01	3.36E-02	2.27E-01	1.89E-01	2.62E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	1.87E-01
	-8.89E-04	(-4.29E-07)	(-4.14E-06)	(-7.01E-08)	(-5.64E-08)	-7.29E-08	-4.97E-08	-3.03E-08	-1.63E-08	-5.56E-09	(-1.94E-10)
	-8.53E-04*	-6.75E-07*	-3.73E-06*	-4.47E-07*	-1.05E-07*	-7.16E-08*	-4.86E-08*	-2.99E-08*	-1.59E-08*	-5.60E-09*	-6.39E-10*
4	-1.7353	-1.3219	-1.0717	-.9041	-.7841	-.6940	-.6240	-.5681	-.5224	-.4845	-.4526
	-5762.7	-7565.0	-9331.2	-11061.1	-12753.9	-14409.0	-16025.8	-17603.4	-19141.2	-20638.4	-22094.5
	1.35E 07	4.05E-08	1.66E-10	5.80E-11	1.56E-12	2.61E-13	1.81E-13	9.95E-14	4.78E-14	1.92E-14	5.16E-15
	2.8971	1.4389	2.4594	1.3526	.5781	.5260	.8229	.8671	.8670	.8468	.7513
	1.01E-03	1.80E-01	8.73E-03	2.05E-01	2.61E-01	2.50E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.84E-01
	(-1.06E-07)	-2.31E-03	(-4.15E-08)	(-1.33E-05)	(-8.92E-07)	(-1.98E-07)	-2.50E-07	-1.82E-07	-1.12E-07	-5.68E-08	-1.82E-08
	-6.56E-03*	-2.17E-03*	-1.31E-05*	-1.14E-05*	-2.11E-06*	-4.53E-07*	-2.61E-07*	-1.78E-07*	-1.10E-07*	-5.62E-08*	-1.97E-08*
5	-2.4942	-1.7207	-1.3196	-1.0744	-.9091	-.7902	-.7007	-.6309	-.5751	-.5295	-.4916
	-4009.3	-5811.5	-7577.8	-9307.6	-11000.4	-12655.5	-14272.3	-15850.0	-17387.7	-18884.9	-20341.0
	2.34E-04	4.77E-08	1.07E-07	9.55E-11	1.82E-10	7.86E-12	9.36E-13	5.69E-13	3.35E-13	1.59E-13	5.96E-14
	1.6808	4.8365	1.5095	3.6226	1.4312	.7737	.5022	.7809	.8611	.8601	.8176
	1.13E-01	1.39E-10	1.60E-01	8.96E-06	1.83E-01	2.86E-01	2.45E-01	2.86E-01	2.88E-01	2.88E-01	2.88E-01
	-7.87E-01	(-7.29E-22)	-4.82E-03	(-2.51E-14)	(-3.27E-05)	(-5.27E-06)	(-6.60E-07)	(-7.51E-07)	-5.92E-07	-3.61E-07	-1.68E-07
	-7.30E-01*	-2.54E-02*	-4.41E-03*	-8.79E-05*	-2.63E-05*	-7.76E-06*	-1.66E-06*	-8.47E-07*	-5.77E-07*	-3.52E-07*	-1.70E-07*
6	-4.3747	-2.4461	-1.7081	-1.3185	-1.0779	-.9147	-.7969	-.7079	-.6384	-.5827	-.5371
	-2285.8	-4088.1	-5854.4	-7584.2	-9277.0	-10932.1	-12548.9	-14126.5	-15664.3	-17161.5	-18617.6
	1.24E-02	3.51E-04	2.37E-08	2.36E-07	1.71E-11	4.58E-10	3.21E-11	3.27E-12	1.60E-12	9.45E-13	4.47E-13
	1.5156	1.7108	-4.7547	1.5800	-6.0921	1.5117	.9278	.5385	.7371	.8428	.8456
	1.58E-01	1.06E-01	1.10E-19	1.40E-01	1.60E-29	1.59E-01	2.86E-01	2.53E-01	2.83E-01	2.88E-01	2.88E-01
	-1.51E+01	(-1.09E+00)	(-2.34E-40)	(-8.21E-03)	(0.00E+00)	(-6.16E-05)	(-2.09E-05)	(-2.39E-06)	(-1.99E-06)	-1.60E-06	-9.69E-07
	-1.51E+01	-9.82E-01*	-7.62E-02*	-7.25E-03*	-3.77E-04*	-4.55E-05*	-2.36E-05*	-5.51E-06*	-2.47E-06*	-1.59E-06*	-9.47E-07*
7	-16.8796	-4.1759	-2.4033	-1.6976	-1.3186	-1.0824	-.9212	-.8043	-.7158	-.6465	-.5909
	-592.4	-2394.7	-4160.9	-5890.8	-7583.6	-9238.7	-10855.5	-12433.1	-13970.9	-15468.1	-16924.2
	1.36E-01	1.74E-02	4.73E-04	6.80E-07	4.46E-07	1.29E-09	9.29E-10	1.09E-10	1.09E-11	4.10E-12	2.32E-12
	1.4265	1.5296	1.7467	.0566	1.6556	.3154	1.6018	1.0540	.6153	.6963	.8128
	1.84E-01	1.54E-01	9.73E-02	1.23E-01	1.20E-01	1.96E-01	1.34E-01	2.72E-01	2.67E-01	2.79E-01	2.87E-01
	-3.88E+00	-2.31E+01	(-1.31E+00)	(-8.54E-03)	(-1.13E-02)	(-1.59E-04)	(-8.68E-05)	-6.27E-05	(-8.61E-06)	(-4.78E-06)	-3.76E-06
	-3.90E+00	-2.32E+01	-1.12E+00*	-1.89E-01*	-9.35E-03*	-1.20E-03*	-5.47E-05*	-6.00E-05*	-1.63E-05*	-6.56E-06*	-3.89E-06*

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.4317	.4765	.5306	.5975	.6821	.7926	.9427	1.1586	1.4949	2.0913	3.4379
	23163.4	20988.5	18846.2	16736.8	14660.3	12617.1	10607.3	8631.2	6689.2	4781.6	2908.7
	6.81E-05	1.45E-03	1.26E-02	5.39E-02	1.09E-01	6.99E-02	9.28E-04	1.01E-01	2.85E-02	9.83E-02	4.18E-02
	.9328	.9579	.9859	1.0165	1.0499	1.0889	1.0196	1.1519	1.2189	1.2330	1.3389
	2.85E-01	2.84E-01	2.81E-01	2.77E-01	2.73E-01	2.67E-01	2.77E-01	2.55E-01	2.40E-01	2.36E-01	2.09E-01
	1.40E+02	2.19E+03	1.35E+04	3.94E+04	5.17E+04	2.02E+04	(1.72E+02)	8.50E+03	9.93E+02	1.22E+03	9.06E+01
	1.42E+02*	2.22E+03*	1.36E+04	3.97E+04	5.18E+04	2.00E+04	2.01E+02*	8.52E+03	9.63E+02	1.23E+03	8.83E+01
9	.4033	.4420	.4883	.5444	.6137	.7017	.8169	.9742	1.2015	1.5588	2.2016
	24796.8	22621.9	20479.7	18370.2	16293.8	14250.5	12240.7	10264.6	8322.6	6415.0	4542.2
	1.90E-05	4.54E-04	4.63E-03	2.51E-02	7.33E-02	1.00E-01	3.19E-02	1.64E-02	1.01E-01	5.45E-03	1.18E-01
	.9172	.9394	.9649	.9932	1.0241	1.0582	1.1019	1.1013	1.1615	1.2623	1.2435
	2.86E-01	2.85E-01	2.83E-01	2.80E-01	2.76E-01	2.72E-01	2.64E-01	2.64E-01	2.53E-01	2.29E-01	2.34E-01
	4.81E+01	8.65E+02	6.44E+03	2.47E+04	4.91E+04	4.34E+04	8.29E+03	2.51E+03	7.55E+03	1.53E+02	1.23E+03
	4.89E+01*	8.78E+02*	6.52E+03*	2.49E+04	4.93E+04	4.33E+04	8.12E+03	2.59E+03	7.53E+03	1.42E+02*	1.23E+03
10	.3788	.4128	.4528	.5007	.5587	.6308	.7223	.8426	1.0074	1.2471	1.6272
	26400.3	24225.4	22083.1	19973.7	17897.2	15853.9	13844.1	11868.1	9926.1	8018.5	6145.6
	5.52E-06	1.43E-04	1.65E-03	1.06E-02	4.03E-02	8.48E-02	7.80E-02	7.56E-03	4.04E-02	8.49E-02	2.21E-04
	.9043	.9234	.9462	.9721	1.0006	1.0318	1.0671	1.1269	1.1178	1.1714	.8923
	2.87E-01	2.86E-01	2.84E-01	2.82E-01	2.79E-01	2.75E-01	2.70E-01	2.60E-01	2.61E-01	2.51E-01	2.87E-01
	1.69E+01	3.37E+02	2.91E+03	1.37E+04	3.65E+04	5.19E+04	3.06E+04	1.73E+03	5.47E+03	5.56E+03	(8.58E+00)
	1.72E+01*	3.43E+02*	2.95E+03*	1.38E+04	3.68E+04	5.21E+04	3.04E+04	1.64E+03*	5.56E+03	5.52E+03	1.36E+01*
11	.3575	.3876	.4227	.4641	.5136	.5738	.6486	.7440	.8696	1.0425	1.2955
	27973.7	25798.8	23656.6	21547.1	19470.7	17427.4	15417.6	13441.5	11499.5	9591.9	7719.1
	1.68E-06	4.62E-05	5.82E-04	4.28E-03	1.96E-02	5.51E-02	8.53E-02	5.02E-02	2.24E-06	6.15E-02	6.01E-02
	.8937	.9097	.9297	.9531	.9794	1.0082	1.0399	1.0774	-.8789	1.1290	1.1825
	2.87E-01	2.87E-01	2.86E-01	2.84E-01	2.82E-01	2.78E-01	2.74E-01	2.69E-01	5.09E-03	2.59E-01	2.48E-01
	6.15E+00	1.32E+02	1.27E+03	7.00E+03	2.33E+04	4.58E+04	4.77E+04	1.78E+04	(1.79E-04)	7.39E+03	3.44E+03
	6.24E+00*	1.34E+02*	1.29E+03*	7.09E+03*	2.35E+04	4.61E+04	4.76E+04	1.76E+04	7.07E+00*	7.46E+03	3.39E+03
12	.3388	.3657	.3968	.4331	.4759	.5271	.5896	.6673	.7667	.8980	1.0796
	29517.2	27342.3	25200.0	23090.6	21014.1	18970.9	16961.1	14985.0	13043.0	11135.4	9262.5
	5.36E-07	1.54E-05	2.07E-04	1.68E-03	8.91E-03	3.08E-02	6.61E-02	7.52E-02	2.48E-02	6.37E-03	7.31E-02
	.8851	.8984	.9155	.9363	.9602	.9868	1.0159	1.0484	1.0905	1.0713	1.1389
	2.88E-01	2.87E-01	2.86E-01	2.85E-01	2.83E-01	2.81E-01	2.77E-01	2.73E-01	2.66E-01	2.70E-01	2.57E-01
	2.31E+00	5.26E+01	5.51E+02	3.42E+03	1.34E+04	3.36E+04	5.03E+04	3.82E+04	7.91E+03	1.30E+03	7.79E+03
	2.34E+00*	5.33E+01*	5.59E+02*	3.46E+03*	1.36E+04*	3.39E+04	5.05E+04	3.81E+04	7.73E+03	1.37E+03*	7.81E+03
13	.3223	.3466	.3743	.4064	.4439	.4882	.5413	.6061	.6870	.7906	.9280
	31030.7	28855.8	26713.6	24604.1	22527.6	20484.4	18474.6	16498.5	14556.5	12648.9	10776.0
	1.79E-07	5.31E-06	7.52E-05	6.58E-04	3.88E-03	1.57E-02	4.23E-02	7.05E-02	5.78E-02	7.47E-03	2.06E-02
	.8780	.8890	.9034	.9215	.9430	.9674	.9943	1.0239	1.0576	1.1133	1.0959
	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.85E-01	2.83E-01	2.80E-01	2.76E-01	2.72E-01	2.62E-01	2.65E-01
	8.95E-01	2.14E+01	2.39E+02	1.63E+03	7.28E+03	2.18E+04	4.23E+04	4.90E+04	2.67E+04	2.11E+03	3.68E+03
	9.06E-01*	2.16E+01*	2.42E+02*	1.65E+03*	7.37E+03*	2.20E+04	4.26E+04	4.91E+04	2.65E+04	2.01E+03*	3.77E+03
14	.3076	.3296	.3546	.3833	.4165	.4552	.5010	.5561	.6234	.7076	.8157
	32514.3	30339.4	28197.1	26087.7	24011.2	21968.0	19958.1	17982.1	16040.1	14132.5	12259.6
	6.20E-08	1.90E-06	2.79E-05	2.59E-04	1.66E-03	7.52E-03	2.41E-02	5.19E-02	6.74E-02	3.79E-02	2.83E-04
	.8715	.8810	.8932	.9088	.9278	.9499	.9747	1.0020	1.0322	1.0681	1.2589
	2.88E-01	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.84E-01	2.82E-01	2.79E-01	2.75E-01	2.70E-01	2.30E-01
	3.58E-01	8.88E+00	1.05E+02	7.65E+02	3.79E+03	1.30E+04	3.08E+04	4.76E+04	4.28E+04	1.58E+04	(5.58E+01)
	3.62E-01*	9.00E+00*	1.06E+02*	7.76E+02*	3.84E+03*	1.32E+04*	3.11E+04	4.79E+04	4.27E+04	1.56E+04	4.37E+01*
15	.2944	.3145	.3373	.3631	.3927	.4270	.4670	.5145	.5716	.6416	.7292
	33967.9	31793.0	29650.8	27541.3	25464.9	23421.6	21411.8	19435.7	17493.7	15586.1	13713.3
	2.22E-08	7.00E-07	1.06E-05	1.03E-04	7.04E-04	3.50E-03	1.27E-02	3.31E-02	5.76E-02	5.79E-02	2.00E-02
	.8651	.8739	.8844	.8978	.9144	.9342	.9569	.9821	1.0098	1.0408	1.0811
	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.86E-01	2.85E-01	2.84E-01	2.81E-01	2.78E-01	2.74E-01	2.68E-01
	1.46E-01	3.78E+00	4.65E+01	3.60E+02	1.93E+03	7.41E+03	2.04E+04	3.89E+04	4.84E+04	3.34E+04	7.50E+03
	1.48E-01*	3.82E+00*	4.71E+01*	3.65E+02*	1.96E+03*	7.51E+03*	2.06E+04	3.92E+04	4.85E+04	3.32E+04	7.32E+03

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	9.3372	-13.6752	-4.0040	-2.3655	-1.6891	-1.3201	-1.0879	-.9285	-.8125	-.7244	-.6553
	1071.0	-731.3	-2497.5	-4227.4	-5920.1	-7575.3	-9192.0	-10769.7	-12307.5	-13804.6	-15260.8
	2.94E-01	1.65E-01	2.30E-02	5.75E-04	3.45E-06	7.21E-07	8.78E-09	1.48E-09	3.10E-10	3.43E-11	9.95E-12
	1.3683	1.4374	1.5446	1.7912	.7608	1.7437	.9535	1.7167	1.1627	.7175	.6642
	2.00E-01	1.81E-01	1.50E-01	8.71E-02	2.85E-01	9.80E-02	2.84E-01	1.04E-01	2.52E-01	2.81E-01	2.75E-01
	2.94E+01	-8.56E+00	-3.28E+01	(-1.34E+00)	(-2.35E-01)	(-1.22E-02)	(-2.23E-03)	(-8.15E-05)	(-1.49E-04)	(-2.89E-05)	(-1.08E-05)
	2.94E+01	-8.60E+00	-3.27E+01	-1.05E+00*	-4.04E-01*	-8.57E-03*	-3.08E-03*	-3.34E-05*	-1.28E-04*	-4.33E-05*	-1.63E-05*
9	3.6977	11.0844	-11.5727	-3.8552	-2.3328	-1.6830	-1.3230	-1.0945	-.9369	-.8216	-.7338
	2704.4	902.2	-864.1	-2593.9	-4286.7	-5941.9	-7558.6	-9136.3	-10674.0	-12171.2	-13627.3
	1.50E-02	2.85E-01	1.94E-01	2.88E-02	6.28E-04	1.08E-05	9.78E-07	3.39E-08	1.68E-09	7.50E-10	1.02E-10
	1.3833	1.3799	1.4489	1.5608	1.8491	1.0550	1.8577	1.2199	1.8971	1.2600	.8320
	1.96E-01	1.97E-01	1.77E-01	1.46E-01	7.48E-02	2.72E-01	7.31E-02	2.39E-01	6.55E-02	2.30E-01	2.88E-01
	2.31E+01	1.65E+01	-1.59E+01	-4.32E+01	(-1.12E+00)	(-6.82E-01)	(-9.15E-03)	-6.00E-03	(-3.55E-05)	(-2.89E-04)	(-8.64E-05)
	2.21E+01	1.65E+01	-1.60E+01	-4.31E+01	-7.33E-01*	-7.59E-01*	-3.89E-03*	-6.44E-03*	-6.58E-08*	-2.27E-04*	-1.04E-04*
10	2.3213	3.9911	13.5258	-10.0960	-3.7268	-2.3050	-1.6792	-1.3275	-1.1025	-.9463	-.8317
	4307.8	2505.6	739.3	-990.5	-2683.3	-4338.4	-5955.2	-7532.8	-9070.6	-10567.8	-12023.9
	1.24E-01	2.27E-03	2.70E-01	2.20E-01	3.44E-02	6.06E-04	2.63E-05	1.06E-06	9.59E-08	1.01E-09	1.53E-09
	1.2535	1.5362	1.3923	1.4609	1.5785	1.9293	1.2249	2.0287	1.3849	2.3294	1.3510
	2.31E-01	1.53E-01	1.94E-01	1.74E-01	1.41E-01	5.98E-02	2.38E-01	4.41E-02	1.96E-01	1.50E-02	2.05E-01
	1.07E+03	(1.68E+00)	8.29E+00	-2.63E+01	-5.33E+01	(-7.16E-01)	-1.28E+00	(-3.59E-03)	-1.11E-02	(-1.08E-06)	(-4.54E-04)
	1.07E+03	1.47E+00*	8.27E+00	-2.64E+01	-5.30E+01	-2.82E-01*	-1.27E+00*	-2.75E-05*	-1.10E-02*	-1.15E-04*	-3.24E-04*
11	1.7003	2.4515	4.3238	17.1539	-9.0103	-3.6167	-2.2822	-1.6780	-1.3338	-1.1118	-.9569
	5881.3	4079.1	2312.8	583.0	-1109.8	-2765.0	-4381.7	-5959.4	-7497.2	-8994.3	-10450.5
	8.46E-03	1.17E-01	3.29E-04	2.52E-01	2.45E-01	3.93E-02	4.99E-04	5.37E-05	8.16E-07	2.16E-07	8.16E-12
	1.1637	1.2636	.6776	1.4058	1.4736	1.5980	2.0524	1.3423	2.3559	1.5144	14.1990
	2.52E-01	2.29E-01	2.77E-01	1.90E-01	1.70E-01	1.35E-01	4.09E-02	2.08E-01	1.35E-02	1.59E-01	0.00E+00
	2.22E+02	8.42E+02	(6.32E-01)	3.65E+00	-3.94E+01	-6.17E+01	(-2.85E-01)	-1.98E+00	(-2.53E-04)	-1.60E-02	(0.00E+00)
	2.35E+02*	8.39E+02	1.45E+00*	3.64E+00	-3.96E+01	-6.12E+01	-9.33E-04*	-1.89E+00*	-1.46E-02*	-1.51E-02*	-7.83E-04*
12	1.3468	1.7786	2.5932	4.7027	23.0606	-8.1867	-3.5233	-2.2645	-1.6796	-1.3421	-1.1227
	7424.8	5622.5	3856.3	2126.4	433.6	-1221.5	-2838.3	-4415.9	-5953.7	-7450.9	-8907.0
	3.51E-02	2.40E-02	1.03E-01	5.44E-03	2.34E-01	2.68E-01	4.32E-02	3.22E-04	9.50E-05	2.73E-07	3.96E-07
	1.1960	1.1923	1.2739	1.1564	1.4203	1.4870	1.6196	2.2759	1.4344	3.4458	1.6373
	2.45E-01	2.46E-01	2.26E-01	2.54E-01	1.86E-01	1.67E-01	1.29E-01	1.85E-02	1.82E-01	3.23E-05	1.25E-01
	1.75E+03	5.22E+02	6.09E+02	6.83E+00	1.33E+00	-5.48E+01	-6.70E+01	(-3.85E-02)	-2.68E+00	(-4.77E-10)	(-1.76E-02)
	1.70E+03	5.38E+02	6.04E+02	7.49E+00*	1.33E+00	-5.51E+01	-6.61E+01	-4.21E-01*	-2.50E+00*	-8.45E-02*	-1.52E-02*
13	1.1188	1.4013	1.8623	2.7473	5.1357	34.2438	-7.5486	-3.4454	-2.2522	-1.6843	-1.3525
	8938.3	7136.1	5369.8	3640.0	1947.2	292.0	-1324.7	-2902.4	-4440.2	-5937.3	-7393.5
	7.35E-02	1.55E-02	4.11E-02	8.43E-02	1.42E-02	2.18E-01	2.88E-01	4.54E-02	1.26E-04	1.49E-04	3.68E-08
	1.1485	1.2159	1.2075	1.2849	1.2207	1.4361	1.5011	1.6441	2.8493	1.5149	-4.9646
	2.55E-01	2.40E-01	2.42E-01	2.23E-01	2.39E-01	1.81E-01	1.62E-01	1.23E-01	1.31E-03	1.59E-01	4.33E-21
	6.93E+03	6.61E+02	7.58E+02	4.10E+02	1.21E+01	3.62E-01	-7.17E+01	-6.80E+01	(-7.60E-05)	-3.17E+00	(-1.13E-42)
	6.92E+03	6.34E+02	7.72E+02	4.05E+02	1.27E+01	3.61E-01	-7.20E+01	-6.66E+01	-2.24E+00*	-2.90E+00*	-2.64E-01*
14	.9595	1.1601	1.4591	1.9518	2.9148	5.6319	62.9628	-7.0481	-3.3823	-2.2453	-1.6921
	10421.9	8619.6	6853.3	5123.5	3430.7	1775.6	158.8	-1418.8	-2956.6	-4453.8	-5909.9
	3.63E-02	6.48E-02	3.91E-03	5.59E-02	6.55E-02	2.38E-02	2.06E-01	3.07E-01	4.57E-02	4.33E-06	2.06E-04
	1.1093	1.1583	1.2597	1.2189	1.2966	1.2475	1.4529	1.5160	1.6723	9.0788	1.5924
	2.63E-01	2.53E-01	2.30E-01	2.40E-01	2.20E-01	2.33E-01	1.76E-01	1.58E-01	1.16E-01	5.75E-41	1.37E-01
	5.75E+03	5.40E+03	1.34E+02	8.74E+02	2.60E+02	1.46E+01	5.19E-02	-8.89E+01	-6.40E+01	(0.00E+00)	(-3.23E+00)
	5.84E+03	5.36E+03	1.23E+02*	8.85E+02	2.55E+02	1.51E+01	5.18E-02	-8.94E+01	-6.19E+01	-6.14E+00*	-2.85E+00*
15	.8421	.9927	1.2038	1.5204	2.0473	3.0967	6.2017	287.2655	-6.6535	-3.3332	-2.2440
	11875.5	10073.3	8307.0	6577.2	4884.4	3229.2	1612.5	34.8	-1503.0	-3000.1	-4456.3
	2.17E-03	4.86E-02	5.09E-02	2.28E-05	6.62E-02	4.86E-02	3.26E-02	1.98E-01	3.24E-01	4.38E-02	8.73E-05
	1.0341	1.1200	1.1688	2.1459	1.2288	1.3095	1.2619	1.4708	1.5317	1.7056	-.1720
	2.75E-01	2.61E-01	2.51E-01	2.98E-02	2.37E-01	2.17E-01	2.29E-01	1.71E-01	1.54E-01	1.07E-01	7.03E-02
	5.59E+02	6.85E+03	3.73E+03	(1.17E-02)	8.79E+02	1.56E+02	1.45E+01	4.95E-04	-1.05E+02	-5.50E+01	(-1.55E-01)
	6.13E+02*	6.91E+03	3.68E+03	1.71E-01*	8.86E+02	1.52E+02	1.49E+01	4.94E-04	-1.06E+02	-5.22E+01	-1.25E+01*

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v"	0	1	2	3	4	5	6	7	8	9	10
16	.2826	.3011	.3218	.3452	.3719	.4025	.4379	.4794	.5286	.5879	.6606
	35391.7	33216.8	31074.5	28965.1	26888.6	24845.3	22835.5	20859.5	18917.5	17009.9	15137.0
	8.12E-09	2.65E-07	4.16E-06	4.18E-05	3.00E-04	1.60E-03	6.43E-03	1.92E-02	4.12E-02	5.83E-02	4.44E-02
	.8578	.8669	.8766	.8883	.9028	.9204	.9409	.9641	.9897	1.0179	1.0501
	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.85E-01	2.83E-01	2.81E-01	2.77E-01	2.73E-01
	6.05E-02	1.63E+00	2.09E+01	1.70E+02	9.73E+02	4.07E+03	1.26E+04	2.83E+04	4.44E+04	4.47E+04	2.32E+04
	6.11E-02*	1.65E+00*	2.12E+01*	1.73E+02*	9.87E+02*	4.13E+03*	1.27E+04*	2.86E+04	4.47E+04	4.47E+04	2.30E+04
17	.2718	.2889	.3080	.3294	.3536	.3811	.4127	.4494	.4923	.5434	.6049
	36785.6	34610.6	32468.4	30358.9	28282.5	26239.2	24229.4	22253.3	20311.4	18403.7	16530.9
	2.99E-09	1.02E-07	1.66E-06	1.72E-05	1.29E-04	7.28E-04	3.16E-03	1.05E-02	2.63E-02	4.70E-02	5.40E-02
	.8490	.8595	.8691	.8797	.8925	.9081	.9266	.9478	.9714	.9974	1.0262
	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.84E-01	2.82E-01	2.80E-01	2.76E-01
	2.50E-02	7.09E-01	9.51E+00	8.09E+01	4.88E+02	2.19E+03	7.44E+03	1.90E+04	3.56E+04	4.64E+04	3.77E+04
	2.53E-02*	7.17E-01*	9.63E+00*	8.20E+01*	4.95E+02*	2.22E+03*	7.54E+03*	1.92E+04	3.59E+04	4.66E+04	3.76E+04
18	.2621	.2780	.2956	.3152	.3373	.3623	.3907	.4234	.4614	.5059	.5588
	38149.6	35974.7	33832.5	31723.0	29646.5	27603.3	25593.5	23617.4	21675.4	19767.8	17895.0
	1.09E-09	3.93E-08	6.67E-07	7.21E-06	5.60E-05	3.31E-04	1.53E-03	5.56E-03	1.56E-02	3.31E-02	4.95E-02
	.8375	.8506	.8612	.8716	.8833	.8971	.9137	.9330	.9548	.9788	1.0053
	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.86E-01	2.85E-01	2.84E-01	2.82E-01	2.79E-01
	1.02E-02	3.07E-01	4.34E+00	3.86E+01	2.44E+02	1.16E+03	4.27E+03	1.21E+04	2.60E+04	4.11E+04	4.47E+04
	1.03E-02*	3.11E-01*	4.39E+00*	3.91E+01*	2.48E+02*	1.18E+03*	4.33E+03*	1.22E+04*	2.63E+04	4.14E+04	4.48E+04
19	.2533	.2680	.2844	.3025	.3228	.3456	.3714	.4008	.4346	.4739	.5200
	39484.0	37309.0	35166.8	33057.3	30980.9	28937.6	26927.8	24951.8	23009.8	21102.2	19229.3
	3.85E-10	1.50E-08	2.69E-07	3.03E-06	2.45E-05	1.51E-04	7.37E-04	2.87E-03	8.86E-03	2.13E-02	3.85E-02
	.8211	.8391	.8521	.8633	.8745	.8872	.9021	.9196	.9396	.9619	.9864
	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.85E-01	2.83E-01	2.81E-01
	3.97E-03	1.31E-01	1.96E+00	1.84E+01	1.22E+02	6.14E+02	2.40E+03	7.39E+03	1.77E+04	3.26E+04	4.38E+04
	4.06E-03*	1.33E-01*	1.99E+00*	1.86E+01*	1.24E+02*	6.22E+02*	2.44E+03*	7.49E+03*	1.80E+04*	3.28E+04	4.40E+04
20	.2452	.2590	.2742	.2910	.3097	.3307	.3542	.3809	.4113	.4463	.4870
	40788.6	38613.7	36471.5	34362.0	32285.6	30242.3	28232.5	26256.4	24314.4	22406.8	20534.0
	1.26E-10	5.51E-09	1.07E-07	1.27E-06	1.07E-05	6.92E-05	3.53E-04	1.45E-03	4.85E-03	1.29E-02	2.69E-02
	.7957	.8231	.8407	.8539	.8657	.8778	.8915	.9074	.9258	.9464	.9692
	2.87E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.87E-01	2.86E-01	2.84E-01	2.83E-01
	1.43E-03	5.32E-02	8.69E-01	8.67E+00	6.07E+01	3.21E+02	1.33E+03	4.39E+03	1.15E+04	2.38E+04	3.77E+04
	1.47E-03*	5.43E-02*	8.83E-01*	8.79E+00*	6.15E+01*	3.25E+02*	1.35E+03*	4.45E+03*	1.17E+04*	2.41E+04	3.80E+04
21	.2377	.2507	.2649	.2806	.2980	.3173	.3389	.3632	.3908	.4223	.4585
	42063.8	39888.8	37746.6	35637.2	33560.7	31517.4	29507.6	27531.6	25589.6	23682.0	21809.1
	3.55E-11	1.88E-09	4.08E-08	5.25E-07	4.68E-06	3.16E-05	1.69E-04	7.31E-04	2.59E-03	7.52E-03	1.75E-02
	.7501	.7983	.8249	.8424	.8559	.8684	.8815	.8962	.9131	.9321	.9533
	2.84E-01	2.87E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01	2.87E-01	2.86E-01	2.85E-01	2.84E-01
	4.32E-04	1.99E-02	3.68E-01	3.99E+00	2.97E+01	1.66E+02	7.26E+02	2.55E+03	7.23E+03	1.65E+04	2.96E+04
	4.61E-04*	2.06E-02*	3.76E-01*	4.05E+00*	3.02E+01*	1.68E+02*	7.36E+02*	2.59E+03*	7.33E+03*	1.67E+04*	2.99E+04

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 14. Radiative transition parameters for N_2^+ $A\ ^2\Pi_u$–$X\ ^2\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
16	.7519	.8698	1.0277	1.2499	1.5853	2.1492	3.2936	6.8561	-126.2308	-6.3436	-3.2976
	13299.2	11497.0	9730.7	8000.9	6308.1	4653.0	3036.2	1458.6	-79.2	-1576.4	-3032.5
	7.22E-03	1.01E-02	5.50E-02	3.56E-02	2.13E-03	7.16E-02	3.47E-02	3.92E-02	1.95E-01	3.38E-01	3.94E-02
	1.1016	1.0753	1.1298	1.1806	1.1035	1.2379	1.3238	1.2695	1.4896	1.5483	1.7465
	2.64E-01	2.69E-01	2.59E-01	2.48E-01	2.64E-01	2.35E-01	2.13E-01	2.27E-01	1.66E-01	1.49E-01	9.73E-02
	2.40E+03	2.25E+03	6.89E+03	2.28E+03	(7.56E+01)	8.07E+02	8.91E+01	1.27E+01	-1.08E-02	-1.19E+02	-4.22E+01
	2.30E+03*	2.34E+03	6.91E+03	2.24E+03	8.53E+01*	8.10E+02	8.66E+01	1.30E+01	-1.08E-02	-1.20E+02	-3.87E+01
17	.6806	.7757	.8989	1.0644	1.2984	1.6538	2.2573	3.5058	7.6065	-54.7909	-6.1027
	14693.1	12890.9	11124.6	9394.8	7702.0	6046.9	4430.1	2852.4	1314.7	-182.5	-1638.6
	2.97E-02	8.71E-04	2.05E-02	5.53E-02	2.19E-02	7.93E-03	7.27E-02	2.40E-02	4.33E-02	1.97E-01	3.50E-01
	1.0605	1.1686	1.0921	1.1394	1.1950	1.1582	1.2465	1.3396	1.2719	1.5089	1.5659
	2.71E-01	2.51E-01	2.66E-01	2.57E-01	2.45E-01	2.53E-01	2.33E-01	2.08E-01	2.26E-01	1.60E-01	1.44E-01
	1.41E+04	(2.38E+02)	4.05E+03	6.14E+03	1.22E+03	2.28E+02	6.95E+02	4.90E+01	1.02E+01	-1.25E-01	-1.30E+02
	1.38E+04	2.08E+02*	4.15E+03	6.13E+03	1.18E+03	2.41E+02*	6.95E+02	4.72E+01	1.04E+01	-1.25E-01	-1.31E+02
18	.6228	.7015	.8007	.9295	1.1030	1.3494	1.7259	2.3716	3.7331	8.4634	-36.4224
	16057.2	14255.0	12488.7	10758.9	9066.1	7410.9	5794.2	4216.5	2678.7	1181.6	-274.6
	4.57E-02	1.67E-02	4.72E-04	3.03E-02	5.06E-02	1.13E-02	1.53E-02	7.07E-02	1.63E-02	4.46E-02	2.06E-01
	1.0349	1.0730	.9632	1.1041	1.1491	1.2146	1.1796	1.2547	1.3571	1.2688	1.5283
	2.75E-01	2.69E-01	2.83E-01	2.64E-01	2.55E-01	2.41E-01	2.49E-01	2.31E-01	2.04E-01	2.27E-01	1.55E-01
	2.90E+04	7.11E+03	(1.49E+02)	5.33E+03	4.98E+03	5.41E+02	3.72E+02	5.72E+02	2.62E+01	7.70E+00	-4.14E-01
	2.88E+04	6.94E+03	1.83E+02*	5.41E+03	4.95E+03	5.17E+02	3.86E+02	5.71E+02	2.50E+01	7.81E+00	-4.17E-01
19	.5750	.6415	.7234	.8269	.9615	1.1435	1.4028	1.8015	2.4919	3.9747	9.4359
	17391.5	15589.3	13823.0	12093.2	10400.4	8745.3	7128.5	5550.8	4013.1	2515.9	1059.8
	4.84E-02	3.52E-02	7.10E-03	4.42E-03	3.75E-02	4.29E-02	4.46E-03	2.25E-02	6.66E-02	1.09E-02	4.34E-02
	1.0133	1.0441	1.0906	1.0541	1.1145	1.1591	1.2476	1.1932	1.2625	1.3757	1.2595
	2.78E-01	2.74E-01	2.66E-01	2.72E-01	2.62E-01	2.53E-01	2.33E-01	2.46E-01	2.29E-01	1.98E-01	2.30E-01
	3.98E+04	2.02E+04	2.70E+03	1.17E+03	5.87E+03	3.73E+03	1.77E+02	4.70E+02	4.57E+02	1.39E+01	5.52E+00
	3.98E+04	2.00E+04	2.58E+03*	1.25E+03*	5.92E+03	3.69E+03	1.65E+02*	4.83E+02	4.55E+02	1.31E+01	5.60E+00
20	.5349	.5919	.6610	.7464	.8543	.9950	1.1858	1.4587	1.8805	2.6174	4.2293
	18696.2	16894.0	15127.7	13397.9	11705.1	10049.9	8433.2	6855.5	5317.8	3820.6	2364.5
	4.18E-02	4.39E-02	2.43E-02	1.62E-03	1.07E-02	4.12E-02	3.40E-02	9.43E-04	2.87E-02	6.16E-02	7.49E-03
	.9941	1.0216	1.0541	1.1290	1.0767	1.1243	1.1698	1.3366	1.2036	1.2698	1.3946
	2.80E-01	2.77E-01	2.72E-01	2.59E-01	2.69E-01	2.60E-01	2.51E-01	2.09E-01	2.43E-01	2.27E-01	1.93E-01
	4.34E+04	3.29E+04	1.26E+04	(5.29E+02)	2.51E+03	5.74E+03	2.60E+03	(2.69E+01)	5.17E+02	3.58E+02	7.47E+00
	4.35E+04	3.27E+04	1.24E+04	4.81E+02*	2.59E+03	5.77E+03	2.56E+03	2.30E+01*	5.27E+02	3.56E+02	6.92E+00*
21	.5007	.5504	.6097	.6815	.7704	.8830	1.0300	1.2299	1.5168	1.9624	2.7476
	19971.3	18169.1	16402.8	14673.0	12980.2	11325.1	9708.3	8130.6	6592.9	5095.7	3639.6
	3.17E-02	4.24E-02	3.71E-02	1.47E-02	6.08E-07	1.74E-02	4.17E-02	2.53E-02	7.32E-07	3.34E-02	5.62E-02
	.9765	1.0019	1.0301	1.0655	-1.9170	1.0906	1.1337	1.1814	-4.2799	1.2124	1.2764
	2.82E-01	2.79E-01	2.76E-01	2.70E-01	9.34E-06	2.66E-01	2.58E-01	2.48E-01	1.07E-16	2.41E-01	2.25E-01
	4.07E+04	4.02E+04	2.52E+04	6.89E+03	(2.35E-10)	3.64E+03	5.16E+03	1.70E+03	(4.89E-33)	5.20E+02	2.79E+02
	4.09E+04	4.02E+04	2.50E+04	6.71E+03	5.72E+00*	3.72E+03	5.17E+03	1.67E+03	2.06E+00*	5.28E+02	2.76E+02

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 15. Radiative transition parameters for N_2^+ $B\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

v'\v"	0	1	2	3	4	5	6	7	8	9	10
0	.3912	.4275	.4706	.5225	.5861	.6659	.7687	.9064	1.1000	1.3922	1.8832
	25564.7	23389.8	21247.6	19138.1	17061.7	15018.4	13008.6	11032.5	9090.5	7182.9	5310.1
	6.63E-01	2.53E-01	6.58E-02	1.45E-02	2.98E-03	6.04E-04	1.26E-04	2.78E-05	6.71E-06	1.82E-06	5.67E-07
	1.0995	1.0508	1.0113	.9762	.9450	.9179	.8953	.8778	.8659	.8598	.8593
	7.13E-01	7.52E-01	7.81E-01	8.07E-01	8.28E-01	8.46E-01	8.61E-01	8.71E-01	8.79E-01	8.82E-01	8.83E-01
	1.14E+07	3.71E+06	7.81E+05	1.34E+05	2.06E+04	2.97E+03	4.15E+02	5.74E+01	7.89E+00	1.06E+00	1.34E-01
	1.14E+07	3.71E+06	7.84E+05	1.35E+05	2.07E+04*	2.99E+03*	4.18E+02*	5.77E+01*	7.93E+00*	1.07E+00*	1.34E-01*
1	.3580	.3882	.4234	.4649	.5146	.5750	.6502	.7460	.8724	1.0466	1.3018
	27936.3	25761.3	23619.1	21509.6	19433.2	17389.9	15380.1	13404.0	11462.0	9554.4	7681.6
	2.92E-01	2.37E-01	2.87E-01	1.29E-01	4.07E-02	1.10E-02	2.76E-03	6.91E-04	1.79E-04	4.99E-05	1.54E-05
	1.1527	1.1115	1.0567	1.0169	.9818	.9508	.9238	.9012	.8836	.8716	.8653
	6.68E-01	7.03E-01	7.47E-01	7.77E-01	8.03E-01	8.24E-01	8.42E-01	8.57E-01	8.68E-01	8.75E-01	8.79E-01
	5.75E+06	4.06E+06	4.27E+06	1.57E+06	3.90E+05	7.94E+04	1.45E+04	2.48E+03	4.12E+02	6.76E+01	1.09E+01
	5.76E+06	4.03E+06	4.28E+06	1.57E+06	3.92E+05	7.99E+04	1.46E+04*	2.49E+03*	4.14E+02*	6.79E+01*	1.10E+01*
2	.3305	.3561	.3855	.4197	.4597	.5074	.5650	.6360	.7257	.8423	1.0000
	30254.5	28079.5	25937.3	23827.9	21751.4	19708.1	17698.3	15722.3	13780.3	11872.6	9999.8
	4.31E-02	4.02E-01	5.72E-02	2.30E-01	1.63E-01	6.97E-02	2.37E-02	7.23E-03	2.13E-03	6.39E-04	2.03E-04
	1.2191	1.1609	1.1357	1.0628	1.0224	.9873	.9565	.9297	.9072	.8897	.8776
	6.08E-01	6.61E-01	6.83E-01	7.42E-01	7.73E-01	7.99E-01	8.20E-01	8.38E-01	8.53E-01	8.64E-01	8.72E-01
	8.94E+05	7.88E+06	9.43E+05	3.48E+06	2.04E+06	6.90E+05	1.79E+05	4.00E+04	8.22E+03	1.62E+03	3.12E+02
	9.02E+05	7.88E+06	9.27E+05	3.47E+06	2.04E+06	6.93E+05	1.80E+05	4.02E+04*	8.27E+03*	1.63E+03*	3.14E+02*
3	.3076	.3296	.3546	.3833	.4165	.4552	.5011	.5561	.6234	.7076	.8157
	32514.1	30339.2	28197.0	26087.5	24011.0	21967.8	19958.0	17981.9	16039.9	14132.3	12259.4
	2.14E-03	1.01E-01	4.19E-01	3.52E-03	1.53E-01	1.67E-01	9.32E-02	3.89E-02	1.41E-02	4.84E-03	1.66E-03
	1.3210	1.2284	1.1702	1.2654	1.0689	1.0279	.9925	.9620	.9355	.9132	.8958
	5.09E-01	6.00E-01	6.53E-01	5.64E-01	7.37E-01	7.69E-01	7.95E-01	8.17E-01	8.35E-01	8.49E-01	8.60E-01
	3.86E+04	2.06E+06	8.10E+06	4.03E+04	2.33E+06	2.13E+06	9.49E+05	3.06E+05	8.22E+04	1.99E+04	4.58E+03
	3.98E+04*	2.08E+06	8.09E+06	3.77E+04*	2.32E+06	2.13E+06	9.52E+05	3.07E+05	8.26E+04	2.01E+04*	4.61E+03*
4	.2881	.3074	.3290	.3536	.3816	.4139	.4514	.4956	.5484	.6125	.6919
	34708.5	32533.6	30391.3	28281.9	26205.4	24162.2	22152.4	20176.3	18234.3	16326.7	14453.8
	7.48E-06	6.26E-03	1.60E-01	3.95E-01	4.21E-03	8.62E-02	1.50E-01	1.07E-01	5.36E-02	2.28E-02	8.97E-03
	1.8293	1.3401	1.2386	1.1808	.9370	1.0751	1.0335	.9975	.9673	.9411	.9192
	-1.32E-01	4.89E-01	5.90E-01	6.43E-01	8.34E-01	7.33E-01	7.65E-01	7.91E-01	8.13E-01	8.31E-01	8.45E-01
	(1.10E+01)	1.04E+05	3.17E+06	7.50E+06	1.07E+05	1.32E+06	1.93E+06	1.11E+06	4.35E+05	1.39E+05	3.92E+04
	2.21E-01*	1.08E+05*	3.19E+06	7.46E+06	1.19E+05*	1.31E+06	1.93E+06	1.11E+06	4.37E+05	1.39E+05	3.94E+04*
5	.2715	.2886	.3076	.3289	.3530	.3805	.4120	.4485	.4913	.5421	.6033
	36829.5	34654.6	32512.4	30402.9	28326.4	26283.2	24273.4	22297.3	20355.3	18447.7	16574.8
	2.34E-06	3.94E-06	1.10E-02	2.13E-01	3.63E-01	2.07E-02	3.99E-02	1.21E-01	1.08E-01	6.50E-02	3.20E-02
	1.1665	2.8861	1.3640	1.2496	1.1932	1.0168	1.0807	1.0394	1.0021	.9724	.9465
	6.56E-01	-2.23E+00	4.64E-01	5.80E-01	6.32E-01	7.77E-01	7.28E-01	7.60E-01	7.88E-01	8.09E-01	8.27E-01
	1.02E+02	(1.65E+03)	1.64E+05	4.07E+06	6.68E+06	4.59E+05	6.12E 05	1.57E+06	1.15E+06	5.42E+05	2.02E+05
	1.10E+02*	3.49E+02*	1.72E+05	4.09E+06	6.63E+06	4.83E+05	6.07E+05	1.56E+06	1.15E+06	5.43E+05	2.03E+05
6	.2573	.2725	.2894	.3082	.3293	.3531	.3801	.4109	.4466	.4881	.5373
	38867.8	36692.9	34550.6	32441.2	30364.7	28321.5	26311.7	24335.6	22393.6	20486.0	18613.1
	8.84E-08	1.79E-05	1.34E-05	1.43E-02	2.56E-01	3.39E-01	3.44E-02	1.32E-02	8.91E-02	1.00E-01	7.11E-02
	1.5229	1.2327	-.0984	1.3958	1.2617	1.2077	1.0192	1.0817	1.0467	1.0062	.9774
	2.83E-01	5.96E-01	1.03E+00	4.30E-01	5.68E-01	6.19E-01	7.76E-01	7.27E-01	7.55E-01	7.85E-01	8.06E-01
	(8.43E-01)	6.35E+02	(1.18E+03)	1.82E+05	4.69E+06	5.97E+06	7.64E+05	2.03E+05	1.15E+06	1.08E+06	6.03E+05
	1.13E+00*	6.74E+02*	4.15E+03*	1.94E+05	4.72E+06	5.90E+06	8.01E+05	2.01E+05	1.15E+06	1.08E+06	6.05E+05
7	.2450	.2588	.2740	.2908	.3095	.3304	.3539	.3805	.4109	.4458	.4864
	40812.9	38637.9	36495.7	34386.3	32309.8	30266.5	28256.7	26280.7	24338.7	22431.1	20558.2
	5.82E-09	2.53E-07	6.98E-05	2.64E-04	1.44E-02	2.90E-01	3.30E-01	3.84E-02	1.56E-03	6.09E-02	8.50E-02
	1.0638	1.7456	1.2920	.8674	1.4437	1.2751	1.2243	.9936	1.0398	1.0575	1.0091
	7.41E-01	-9.81E-03	5.38E-01	8.78E-01	3.76E-01	5.55E-01	6.04E-01	7.94E-01	7.60E-01	7.46E-01	7.83E-01
	(4.41E-01)	(2.84E-03)	1.99E+03	(1.68E+04)	1.39E+05	5.02E+06	5.50E+06	8.90E+05	2.63E+04	7.76E+05	9.18E+05
	4.98E-01*	3.18E-01*	2.11E+03*	2.04E+04*	1.54E+05	5.04E+06	5.42E+06	9.44E+05	2.64E+04*	7.68E+05	9.19E+05

Table 15. Radiative transition parameters for N_2^+ $B\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. –Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
0	2.8799	5.9878	-103.9263	-5.4763	-2.8418	-1.9327	-1.4726	-1.1950	-1.0095	-.8769	-.7776
	3472.3	1670.1	-96.2	-1826.0	-3518.8	-5174.0	-6790.8	-8368.4	-9906.2	-11403.4	-12859.5
	2.05E-07	8.58E-08	4.12E-08	2.22E-08	1.31E-08	8.31E-09	5.55E-09	3.86E-09	2.77E-09	2.04E-09	1.54E-09
	.8633	.8702	.8779	.8851	.8909	.8951	.8978	.8994	.9001	.9003	.9001
	8.80E-01	8.76E-01	8.71E-01	8.67E-01	8.63E-01	8.61E-01	8.59E-01	8.58E-01	8.58E-01	8.57E-01	8.58E-01
	1.35E-02	6.21E-04	-5.65E-08	-2.06E-04	-8.63E-04	-1.73E-03	-2.60E-03	-3.37E-03	-4.01E-03	-4.51E-03	-4.87E-03
	1.35E-02*	6.21E-04*	-5.64E-08*	-2.06E-04*	-8.62E-04*	-1.73E-03*	-2.60E-03*	-3.37E-03*	-4.01E-03*	-4.51E-03*	-4.87E-03*
1	1.7112	2.4743	4.3950	18.3328	-8.7159	-3.5683	-2.2628	-1.6675	-1.3272	-1.1072	-.9535
	5843.8	4041.6	2275.3	545.5	-1147.3	-2802.5	-4419.2	-5996.9	-7534.7	-9031.8	-10488.0
	5.36E-06	2.14E-06	9.74E-07	5.00E-07	2.85E-07	1.76E-07	1.15E-07	7.96E-08	5.69E-08	4.20E-08	3.17E-08
	.8643	.8675	.8732	.8797	.8859	.8908	.8945	.8970	.8985	.8993	.8996
	8.80E-01	8.78E-01	8.74E-01	8.70E-01	8.67E-01	8.63E-01	8.61E-01	8.60E-01	8.59E-01	8.58E-01	8.58E-01
	1.68E+00	2.20E-01	1.78E-02	1.25E-04	-6.54E-04	-5.84E-03	-1.50E-02	-2.57E-02	-3.64E-02	-4.61E-02	-5.46E-02
	1.68E+00*	2.21E-01*	1.78E-02*	1.24E-04*	-6.53E-04*	-5.83E-03*	-1.49E-02*	-2.57E-02*	-3.64E-02*	-4.61E-02*	-5.45E-02*
2	1.2252	1.5724	2.1770	3.4920	8.5406	-20.6504	-4.7596	-2.7184	-1.9170	-1.4895	-1.2240
	8162.0	6359.8	4593.5	2863.7	1170.9	-484.3	-2101.0	-3678.7	-5216.4	-6713.6	-8169.7
	7.04E-05	2.72E-05	1.19E-05	5.84E-06	3.19E-06	1.90E-06	1.22E-06	8.30E-07	5.89E-07	4.33E-07	3.27E-07
	.8710	.8694	.8717	.8763	.8817	.8868	.8910	.8942	.8964	.8978	.8987
	8.76E-01	8.77E-01	8.75E-01	8.72E-01	8.69E-01	8.66E-01	8.63E-01	8.61E-01	8.60E-01	8.59E-01	8.58E-01
	5.94E+01	1.09E+01	1.79E+00	2.11E-01	7.83E-03	-3.28E-04	-1.71E-02	-6.21E-02	-1.25E-01	-1.96E-01	-2.66E-01
	5.97E+01*	1.09E+01*	1.79E+00*	2.11E-01*	7.82E-03*	-3.28E-04*	-1.71E-02*	-6.21E-02*	-1.25E-01*	-1.96E-01*	-2.66E-01*
3	.9595	1.1602	1.4592	1.9519	2.9150	5.6325	63.0382	-7.0471	-3.3820	-2.2452	-1.6920
	10421.7	8619.4	6853.2	5123.3	3430.5	1775.4	158.6	-1419.0	-2956.8	-4454.0	-5910.1
	5.95E-04	2.30E-04	9.82E-05	4.66E-05	2.45E-05	1.41E-05	8.83E-06	5.88E-06	4.12E-06	3.00E-06	2.26E-06
	.8837	.8768	.8746	.8760	.8795	.8838	.8879	.8914	.8942	.8961	.8975
	8.68E-01	8.72E-01	8.73E-01	8.73E-01	8.70E-01	8.68E-01	8.65E-01	8.63E-01	8.61E-01	8.60E-01	8.59E-01
	1.03E+03	2.27E+02	4.89E+01	9.66E+00	1.52E+00	1.21E-01	5.35E-05	-2.54E-02	-1.60E-01	-3.97E-01	-6.97E-01
	1.03E+03*	2.28E+02*	4.90E+01*	9.68E+00*	1.52E+00*	1.21E-01*	5.34E-05*	-2.53E-02*	-1.60E-01*	-3.97E-01*	-6.97E-01*
4	.7926	.9247	1.1053	1.3665	1.7778	2.5190	4.2499	12.8972	-13.1163	-4.4256	-2.6913
	12616.1	10813.8	9047.5	7317.7	5624.9	3969.8	2353.0	775.4	-762.4	-2259.6	-3715.7
	3.49E-03	1.40E-03	6.02E-04	2.81E-04	1.44E-04	8.06E-05	4.89E-05	3.18E-05	2.19E-05	1.58E-05	1.18E-05
	.9020	.8899	.8827	.8799	.8804	.8828	.8861	.8893	.8922	.8945	.8961
	8.56E-01	8.64E-01	8.68E-01	8.70E-01	8.70E-01	8.68E-01	8.66E-01	8.64E-01	8.63E-01	8.61E-01	8.60E-01
	1.04E+04	2.69E+03	6.81E+02	1.69E+02	3.92E+01	7.70E+00	9.69E-01	2.25E-02	-1.46E-02	-2.74E-01	-9.06E-01
	1.05E+04*	2.70E+03*	6.84E+02*	1.69E+02*	3.93E+01*	7.71E+00*	9.70E-01*	2.25E-02*	-1.46E-02*	-2.74E-01*	-9.06E-01*
5	.6786	.7731	.8954	1.0595	1.2910	1.6418	2.2351	3.4526	7.3604	-72.1709	-6.2709
	14737.1	12934.8	11168.6	9438.7	7745.9	6090.8	4474.0	2896.4	1358.6	-138.6	-1594.7
	1.43E-02	6.29E-03	2.82E-03	1.33E-03	6.75E-04	3.71E-04	2.20E-04	1.40E-04	9.47E-05	6.72E-05	4.97E-05
	.9251	.9082	.8961	.8887	.8853	.8849	.8863	.8886	.8910	.8932	.8950
	8.41E-01	8.52E-01	8.60E-01	8.65E-01	8.67E-01	8.67E-01	8.66E-01	8.65E-01	8.63E-01	8.62E-01	8.61E-01
	6.59E+04	2.00E+04	5.88E+03	1.69E+03	4.77E+02	1.28E+02	3.00E+01	5.16E+00	3.59E-01	-2.69E-04	-3.03E-01
	6.62E+04	2.01E+04*	5.91E+03*	1.70E+03*	4.79E+02*	1.28E+02*	3.00E+01*	5.16E+00*	3.59E-01*	-2.69E-04*	-3.02E-01*
6	.5961	.6679	.7572	.8713	1.0221	1.2301	1.5355	2.0265	2.9439	5.2639	22.5423
	16775.4	14973.1	13206.9	11477.0	9784.2	8129.1	6512.3	4934.7	3396.9	1899.7	443.6
	4.01E-02	2.04E-02	9.98E-03	4.95E-03	2.56E-03	1.40E-03	8.23E-04	5.16E-04	3.43E-04	2.40E-04	1.76E-04
	.9517	.9308	.9143	.9023	.8946	.8907	.8894	.8899	.8913	.8929	.8945
	8.24E-01	8.38E-01	8.49E-01	8.56E-01	8.61E-01	8.64E-01	8.64E-01	8.64E-01	8.63E-01	8.62E-01	8.61E-01
	2.60E+05	9.72E+04	3.35E+04	1.11E+04	3.60E+03	1.14E+03	3.44E+02	9.38E+01	2.03E+01	2.48E+00	2.30E-02
	2.61E+05	9.76E+04	3.37E+04*	1.12E+04*	3.61E+03*	1.14E+03*	3.45E+02*	9.39E+01*	2.03E+01*	2.48E+00*	2.30E-02*
7	.5342	.5911	.6600	.7450	.8526	.9926	1.1824	1.4535	1.8720	2.6009	4.1864
	18720.4	16918.2	15151.9	13422.1	11729.3	10074.1	8457.4	6879.7	5342.0	3844.8	2388.7
	7.12E-02	4.56E-02	2.61E-02	1.42E-02	7.75E-03	4.36E-03	2.57E-03	1.61E-03	1.06E-03	7.33E-04	5.31E-04
	.9822	.9565	.9363	.9202	.9083	.9005	.8960	.8940	.8936	.8941	.8951
	8.02E-01	8.20E-01	8.34E-01	8.45E-01	8.52E-01	8.57E-01	8.60E-01	8.61E-01	8.62E-01	8.61E-01	8.61E-01
	6.09E+05	3.01E+05	1.28E+05	4.96E+04	1.84E+04	6.64E+03	2.33E+03	7.86E+02	2.43E+02	6.26E+01	1.09E+01
	6.10E+05	3.02E+05	1.28E+05	4.98E+04	1.85E+04*	6.66E+03*	2.34E+03*	7.88E+02*	2.43E+02*	6.27E+01*	1.09E+01*

Table 15. Radiative transition parameters for N_2^+ $B\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. –Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.2344	.2470	.2609	.2760	.2928	.3115	.3323	.3556	.3820	.4120	.4465
	42653.3	40478.3	38336.1	36226.7	34150.2	32106.9	30097.1	28121.1	26179.1	24271.4	22398.6
	3.03E-10	9.94E-08	3.77E-08	1.77E-04	1.39E-03	1.03E-02	3.11E-01	3.43E-01	3.16E-02	7.97E-04	3.92E-02
	1.6528	1.1988	3.9364	1.3553	1.0785	1.5331	1.2900	1.2426	.9262	1.2930	1.0779
	1.18E-01	6.27E-01	-5.35E+00	4.73E-01	7.30E-01	2.71E-01	5.40E-01	5.86E-01	8.41E-01	5.37E-01	7.30E-01
	(6.61E-04)	5.25E+00	(1.23E+02)	3.81E+03	6.00E+04	(5.07E+04)	5.02E+06	5.31E+06	8.13E+05	6.66E+03	4.76E+05
	2.15E-03*	5.68E+00*	1.88E+01*	4.11E+03*	6.49E+04*	6.55E+04	5.04E+06	5.20E+06	8.96E+05	6.36E+03*	4.66E+05
9	.2253	.2370	.2496	.2635	.2788	.2956	.3143	.3351	.3584	.3847	.4145
	44377.3	42202.3	40060.1	37950.6	35874.2	33830.9	31821.1	29845.0	27903.0	25995.4	24122.6
	2.83E-11	5.02E-10	6.81E-07	2.21E-06	2.93E-04	4.52E-03	3.36E-03	3.12E-01	3.77E-01	1.75E-02	8.71E-03
	1.2048	2.4759	1.2983	.6988	1.4415	1.1812	1.8162	1.3067	1.2614	.7461	1.2359
	6.22E-01	-1.29E+00	5.32E-01	9.66E-01	3.79E-01	6.43E-01	-1.12E-01	5.23E-01	5.68E-01	9.44E-01	5.93E-01
	(1.93E-03)(	1.28E-01)	2.51E+01	(2.29E+02)(	3.93E+03)	1.47E+05	(2.77E+03)	4.60E+06	5.35E+06	(5.55E+05)	8.70E+04
	2.35E-03*	2.74E-02*	2.70E+01*	3.24E+02*	4.51E+03*	1.53E+05*	1.90E+02*	4.61E+06	5.23E+06	6.94E+05	8.20E+04*
10	.2175	.2283	.2401	.2529	.2669	.2823	.2992	.3180	.3390	.3624	.3888
	45975.1	43800.2	41657.9	39548.5	37472.0	35428.7	33418.9	31442.9	29500.9	27593.3	25720.4
	3.47E-12	8.65E-10	5.91E-09	2.36E-06	3.23E-05	2.50E-04	1.06E-02	3.01E-04	2.79E-01	4.27E-01	3.74E-03
	1.4757	1.3592	.3943	1.4072	1.0955	1.6252	1.2510	-.6894	1.3262	1.2791	-.0365
	3.39E-01	4.69E-01	1.06E+00	4.17E-01	7.16E-01	1.54E-01	5.78E-01	6.90E-01	5.03E-01	5.51E-01	1.04E+00
	7.87E-05 (	3.24E-02)(	9.70E-01)(	5.15E+01)	1.77E+03	(5.36E+02)	2.68E+05	(9.03E+03)	3.68E+06	5.52E+06	(1.40E+05)
	7.40E-05*	3.90E-02*	1.81E+00*	5.78E+01*	1.95E+03*	1.13E+03*	2.76E+05	1.17E+05*	3.69E+06	5.37E+06	4.23E+05*

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	.4864	.5331	.5885	.6552	.7369	.8393	.9711	1.1468	1.3923	1.7590	2.3646
	20560.8	18758.6	16992.3	15262.5	13569.7	11914.5	10297.8	8720.1	7182.4	5685.2	4229.1
	6.58E-02	6.56E-02	4.75E-02	3.03E-02	1.82E-02	1.09E-02	6.63E-03	4.20E-03	2.77E-03	1.92E-03	1.38E-03
	1.0094	.9876	.9609	.9414	.9259	.9142	.9060	.9011	.8986	.8974	.8971
	7.83E-01	7.99E-01	8.17E-01	8.31E-01	8.41E-01	8.49E-01	8.54E-01	8.57E-01	8.59E-01	8.59E-01	8.59E-01
	7.10E+05	5.60E+05	3.15E+05	1.50E+05	6.53E+04	2.69E+04	1.07E+04	4.14E+03	1.53E+03	5.26E+02	1.56E+02
	7.11E+05	5.59E+05	3.16E+05	1.51E+05	6.56E+04	2.70E+04	1.07E+04*	4.15E+03*	1.54E+03*	5.27E+02*	1.56E+02*
9	.4487	.4882	.5343	.5887	.6539	.7332	.8318	.9575	1.1228	1.3497	1.6798
	22284.8	20482.6	18716.3	16986.5	15293.7	13638.5	12021.8	10444.1	8906.3	7409.2	5953.0
	2.47E-02	4.56E-02	5.58E-02	4.51E-02	3.20E-02	2.12E-02	1.38E-02	9.03E-03	6.08E-03	4.24E-03	3.07E-03
	1.1218	1.0034	.9944	.9647	.9463	.9310	.9199	.9115	.9059	.9029	.9013
	6.94E-01	7.87E-01	7.94E-01	8.15E-01	8.27E-01	8.38E-01	8.45E-01	8.50E-01	8.54E-01	8.56E-01	8.57E-01
	2.67E+05	4.91E+05	4.67E+05	2.97E+05	1.59E+05	7.63E+04	3.46E+04	1.51E+04	6.35E+03	2.56E+03	9.63E+02
	2.57E+05	4.95E+05	4.65E+05	2.98E+05	1.59E+05	7.66E+04	3.47E+04	1.51E+04*	6.37E+03*	2.57E+03*	9.64E+02*
10	.4187	.4529	.4923	.5381	.5920	.6563	.7342	.8304	.9520	1.1102	1.3244
	23882.6	22080.4	20314.1	18584.3	16891.5	15236.4	13619.6	12041.9	10504.2	9007.0	7550.9
	2.61E-02	1.68E-02	2.70E-02	4.39E-02	3.90E-02	3.07E-02	2.22E-02	1.56E-02	1.10E-02	7.86E-03	5.76E-03
	1.2595	1.2100	.9808	1.0048	.9675	.9513	.9354	.9251	.9169	.9107	.9068
	5.70E-01	6.17E-01	8.03E-01	7.86E-01	8.13E-01	8.24E-01	8.35E-01	8.41E-01	8.47E-01	8.51E-01	8.53E-01
	2.34E+05	1.40E+05	2.96E+05	3.53E+05	2.52E+05	1.49E+05	7.90E+04	3.92E+04	1.85E+04	8.42E+03	3.66E+03
	2.18E+05	1.30E+05	3.03E+05	3.50E+05	2.52E+05	1.50E+05	7.93E+04	3.93E+04	1.86E+04	8.44E+03*	3.66E+03*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 16. Radiative transition parameters for N_2^+ $C\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

v'\v"	0	1	2	3	4	5	6	7	8	9	10
0	.1549	.1603	.1660	.1721	.1785	.1852	.1924	.2000	.2080	.2166	.2258
	64540.1	62365.2	60223.0	58113.5	56037.1	53993.8	51984.0	50007.9	48065.9	46158.3	44285.5
	1.19E-02	7.15E-02	1.87E-01	2.77E-01	2.52E-01	1.43E-01	4.86E-02	8.65E-03	5.36E-04	9.97E-08	5.24E-06
	1.1948	1.2126	1.2318	1.2527	1.2762	1.3037	1.3384	1.3889	1.4959	-2.6964	1.3347
	1.31E-01	1.47E-01	1.66E-01	1.86E-01	2.10E-01	2.36E-01	2.66E-01	3.00E-01	3.06E-01	0.00E+00	2.63E-01
	1.11E+05	7.62E+05	2.27E+06	3.82E+06	3.94E+06	2.54E+06	9.80E+05	1.97E+05	(1.13E+04)(	0.00E+00)(	6.40E+01)
	1.13E+05	7.71E+05	2.28E+06	3.81E+06	3.93E+06	2.54E+06	1.00E+06	2.16E+05*	1.87E+04*	7.43E+01*	1.27E+02*
1	.1502	.1552	.1606	.1662	.1722	.1784	.1851	.1921	.1995	.2074	.2158
	66591.7	64416.7	62274.5	60165.0	58088.6	56045.3	54035.5	52059.5	50117.5	48209.9	46337.0
	4.50E-02	1.52E-01	1.61E-01	3.14E-02	2.92E-02	1.90E-01	2.36E-01	1.24E-01	2.86E-02	1.87E-03	8.17E-06
	1.1780	1.1940	1.2100	1.2203	1.2692	1.2830	1.3089	1.3434	1.3954	1.5143	.4444
	1.16E-01	1.30E-01	1.45E-01	1.55E-01	2.03E-01	2.16E-01	2.41E-01	2.70E-01	3.03E-01	2.98E-01	3.71E-07
	3.63E+05	1.39E+06	1.65E+06	3.31E+05	4.75E+05	3.17E+06	4.38E+06	2.60E+06	6.67E+05	(3.77E+04)(	2.26E-10)
	3.71E+05	1.41E+06	1.65E+06	3.25E+05	4.74E+05	3.13E+06	4.34E+06	2.62E+06	7.26E+05	6.76E+04*	2.92E+01*
2	.1457	.1505	.1555	.1608	.1663	.1722	.1784	.1849	.1918	.1990	.2068
	68620.8	66445.9	64303.6	62194.2	60117.7	58074.5	56064.7	54088.6	52146.6	50239.0	48366.2
	9.10E-02	1.55E-01	3.09E-02	3.44E-02	1.19E-01	1.94E-02	5.97E-02	2.35E-01	1.96E-01	5.67E-02	3.77E-03
	1.1626	1.1772	1.1884	1.2184	1.2299	1.2281	1.2990	1.3160	1.3493	1.4026	1.5363
	1.03E-01	1.15E-01	1.25E-01	1.53E-01	1.64E-01	1.62E-01	2.32E-01	2.47E-01	2.75E-01	3.06E-01	2.85E-01
	6.36E+05	1.22E+06	2.61E+05	3.91E+05	1.40E+06	2.02E+05	1.14E+06	4.60E+06	4.25E+06	1.36E+06	(7.01E+04)
	6.49E+05	1.22E+06	2.48E+05	4.07E+05	1.41E+06	2.06E+05	1.10E+06	4.48E+06	4.23E+06	1.47E+06	1.41E+05*
3	.1416	.1461	.1508	.1558	.1610	.1664	.1722	.1783	.1847	.1914	.1985
	70625.0	68450.1	66307.8	64198.4	62121.9	60078.7	58068.9	56092.8	54150.8	52243.2	50370.3
	1.31E-01	8.92E-02	5.45E-03	9.61E-02	1.49E-02	5.40E-02	8.17E-02	2.72E-03	1.81E-01	2.49E-01	8.89E-02
	1.1483	1.1613	1.1905	1.1950	1.1994	1.2373	1.2445	1.4128	1.3264	1.3561	1.4104
	9.22E-02	1.02E-01	1.27E-01	1.31E-01	1.35E-01	1.71E-01	1.78E-01	3.09E-01	2.56E-01	2.80E-01	3.08E-01
	7.92E+05	6.06E+05	(5.18E+04)	8.83E+05	1.32E+05	6.94E+05	1.03E+06	9.29E+04	3.84E+06	5.62E+06	2.19E+06
	8.05E+05	5.93E+05	6.00E+04*	8.90E+05	1.23E+05	7.13E+05	1.05E+06	9.32E+04*	3.65E+06	5.50E+06	2.34E+06
4	.1377	.1420	.1464	.1511	.1560	.1611	.1665	.1722	.1782	.1844	.1910
	72601.6	70426.7	68284.4	66175.0	64098.5	62055.3	60045.5	58069.4	56127.4	54219.8	52347.0
	1.49E-01	2.35E-02	5.65E-02	4.60E-02	2.17E-02	7.00E-02	1.99E-03	9.04E-02	9.01E-03	1.20E-01	2.82E-01
	1.1349	1.1452	1.1659	1.1760	1.2030	1.2100	1.2851	1.2506	1.1950	1.3422	1.3642
	8.24E-02	8.99E-02	1.06E-01	1.14E-01	1.38E-01	1.45E-01	2.18E-01	1.84E-01	1.31E-01	2.69E-01	2.85E-01
	7.86E+05	1.34E+05	4.09E+05	3.53E+05	2.21E+05	7.10E+05	(4.15E+04)	1.22E+06	(5.53E+04)	2.80E+06	6.67E+06
	7.94E+05	1.23E+05	4.26E+05	3.39E+05	2.38E+05	7.06E+05	4.66E+04*	1.25E+06	7.87E+04*	2.57E+06	6.38E+06
5	.1341	.1382	.1424	.1468	.1514	.1562	.1613	.1666	.1722	.1780	.1842
	74548.1	72373.2	70230.9	68121.5	66045.0	64001.8	61992.0	60015.9	58073.9	56166.3	54293.4
	1.45E-01	6.38E-06	8.10E-02	6.82E-04	6.79E-02	3.76E-03	6.22E-02	1.27E-02	5.76E-02	3.59E-02	6.99E-02
	1.1224	.8947	1.1503	1.1309	1.1807	1.1738	1.2151	1.2100	1.2570	1.2359	1.3676
	7.40E-02	4.90E-03	9.37E-02	7.97E-02	1.18E-01	1.12E-01	1.50E-01	1.45E-01	1.91E-01	1.70E-01	2.87E-01
	6.64E+05	(1.18E-01)	4.99E+05	(2.77E+03)	5.55E+05	(2.53E+04)	6.71E+05	1.16E+05	8.29E+05	(3.71E+05)(	1.87E+06)
	6.64E+05	5.99E+02*	5.03E+05	9.40E+02*	5.63E+05	1.96E+04*	6.87E+05	1.10E+05	8.68E+05	4.53E+05	1.63E+06
6	.1308	.1346	.1386	.1428	.1471	.1517	.1565	.1615	.1667	.1722	.1779
	76461.8	74286.9	72144.6	70035.2	67958.7	65915.5	63905.7	61929.6	59987.6	58080.0	56207.2
	1.24E-01	1.51E-02	5.60E-02	1.98E-02	4.14E-02	2.17E-02	3.80E-02	2.23E-02	4.23E-02	2.20E-02	5.71E-02
	1.1105	1.1283	1.1361	1.1562	1.1632	1.1872	1.1921	1.2231	1.2230	1.2683	1.2460
	6.65E-02	7.79E-02	8.33E-02	9.82E-02	1.04E-01	1.24E-01	1.28E-01	1.57E-01	1.57E-01	2.02E-01	1.80E-01
	4.96E+05	(7.61E+04)	2.96E+05	1.33E+05	2.83E+05	1.94E+05	3.31E+05	2.65E+05	4.57E+05	3.56E+05	(6.63E+05)
	4.91E+05	8.58E+04	2.86E+05	1.47E+05	2.72E+05	2.10E+05	3.20E+05	2.83E+05	4.54E+05	3.84E+05	8.02E+05
7	.1276	.1313	.1351	.1391	.1432	.1475	.1520	.1567	.1616	.1668	.1722
	78340.2	76165.2	74023.0	71913.5	69837.1	67793.8	65784.0	63808.0	61866.0	59958.4	58085.5
	9.68E-02	4.40E-02	1.86E-02	5.25E-02	3.37E-03	5.35E-02	6.24E-05	5.35E-02	7.55E-04	5.63E-02	2.93E-03
	1.0994	1.1145	1.1215	1.1401	1.1386	1.1676	1.0304	1.1969	1.2831	1.2284	1.3110
	5.99E-02	6.89E-02	7.34E-02	8.61E-02	8.51E-02	1.07E-01	2.92E-02	1.33E-01	2.16E-01	1.62E-01	2.43E-01
	3.39E+05	1.87E+05	(8.23E+04)	2.93E+05	(1.68E+04)	3.89E+05	(3.08E+01)	4.95E+05	(1.69E+04)	6.47E+05	(6.86E+04)
	3.31E+05	1.98E+05	7.29E+04	3.04E+05	1.16E+04*	3.95E+05	5.77E+02*	5.00E+05	2.16E+04*	6.56E+05	8.21E+04*

Table 16. Radiative transition parameters for N_2^+ $C\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	.2356	.2460	.2572	.2692	.2820	.2958	.3107	.3267	.3440	.3627	.3829
	42447.7	40645.5	38879.2	37149.4	35456.6	33801.5	32184.7	30607.1	29069.3	27572.2	26116.0
	8.84E-08	7.47E-08	2.11E-09	2.09E-09	6.29E-12	8.02E-11	2.92E-12	1.98E-12	9.11E-13	8.54E-15	4.93E-14
	1.8639	1.2661	1.8420	1.2832	3.0950	1.3673	.8451	1.5553	1.2447	.1006	1.4748
	3.12E-02	2.00E-01	3.96E-02	2.16E-01	4.29E-17	2.87E-01	2.25E-03	2.71E-01	1.78E-01	6.66E-12	3.12E-01
	(1.33E-02)(	4.05E-01)(	3.93E-04)(	1.01E-02)(	1.05E-36)(	5.18E-04)(	1.00E-09)(	8.45E-06)(	1.44E-06)(	1.61E-29)(	1.74E-07)
	9.91E+00*	1.02E+00*	2.26E-01*	2.41E-02*	3.80E-03*	1.23E-03*	1.38E-05*	5.81E-05*	3.25E-06*	7.80E-07*	6.58E-07*
1	.2247	.2342	.2443	.2551	.2666	.2789	.2921	.3062	.3213	.3376	.3550
	44499.3	42697.0	40930.7	39200.9	37508.2	35853.0	34236.3	32658.6	31120.8	29623.7	28167.6
	2.89E-05	6.40E-08	5.96E-07	3.02E-10	1.84E-08	3.67E-10	5.18E-10	1.14E-10	1.91E-12	9.68E-12	1.19E-12
	1.3717	2.8880	1.3324	5.1741	1.3707	.6924	1.4987	1.1816	2.3779	1.3969	1.0780
	2.90E-01	2.37E-13	2.61E-01	0.00E+00	2.89E-01	1.36E-04	3.05E-01	1.19E-01	2.82E-06	3.03E-01	4.86E-02
	(4.34E+02)(	5.66E-25)(	5.65E+00)(	0.00E+00)(	1.65E-01)(	6.34E-10)(	3.92E-03)(	1.15E-04)(	9.29E-16)(	4.69E-05)(	1.28E-07)
	8.21E+02*	3.07E+01*	1.22E+01*	7.66E-01*	3.76E-01*	5.31E-03*	1.58E-02*	3.18E-04*	4.00E-04*	1.26E-04*	8.58E-08*
2	.2149	.2236	.2328	.2425	.2529	.2640	.2757	.2883	.3017	.3159	.3312
	46528.4	44726.2	42959.9	41230.1	39537.3	37882.2	36265.4	34687.8	33150.0	31652.8	30196.7
	6.81E-05	8.46E-05	2.14E-07	2.22E-06	3.75E-08	6.47E-08	8.93E-09	8.00E-10	9.94E-10	3.70E-11	2.71E-11
	.8790	1.4098	-.1624	1.3949	.6878	1.4674	1.1254	1.7946	1.3270	.7837	1.6247
	3.86E-03	3.08E-01	1.80E-16	3.02E-01	1.24E-04	3.14E-01	7.60E-02	6.34E-02	2.57E-01	7.86E-04	2.09E-01
	(2.08E-01)(	1.46E+03)(	1.12E-30)(	2.88E+01)(	7.18E-08)(	7.01E-01)(	4.98E-03)(	2.72E-04)(	4.84E-03)(	1.47E-09)(	6.59E-05)
	1.91E+02*	2.79E+03*	2.86E+01*	6.26E+01*	4.30E-01*	2.14E+00*	1.75E-02*	6.63E-02*	1.13E-02*	3.00E-04*	1.01E-03*
3	.2060	.2140	.2224	.2313	.2407	.2507	.2613	.2725	.2845	.2971	.3106
	48532.6	46730.4	44964.1	43234.3	41541.5	39886.4	38269.6	36692.0	35154.2	33657.0	32200.9
	5.68E-03	2.82E-04	1.71E-04	4.86E-06	5.00E-06	4.93E-07	1.04E-07	5.82E-08	4.20E-11	3.23E-09	7.93E-10
	1.5633	1.0571	1.4522	.8914	1.4663	1.0903	1.6273	1.2714	-2.9573	1.4612	1.1886
	2.65E-01	3.92E-02	3.15E-01	4.66E-03	3.14E-01	5.49E-02	2.06E-01	2.05E-01	0.00E+00	3.14E-01	1.25E-01
	(9.23E+04)(	8.97E+01)(	3.13E+03)(	1.73E-02)(	7.15E+01)(	1.91E-01)(	5.00E-01)(	2.44E-01)(	0.00E+00)(	2.46E-02)(	8.42E-04)
	2.20E+05*	2.83E+03*	6.57E+03*	2.90E-02*	1.92E+02*	1.12E+00*	6.26E+00*	6.03E-01*	9.40E-02*	8.08E-02*	2.25E-03*
4	.1980	.2053	.2130	.2212	.2298	.2389	.2485	.2586	.2693	.2806	.2926
	50509.2	48707.0	46940.7	45210.9	43518.1	41863.0	40246.2	38668.6	37130.8	35633.7	34177.5
	1.22E-01	7.06E-03	8.04E-04	2.61E-04	2.67E-05	7.12E-06	2.40E-06	4.20E-08	1.87E-07	1.42E-08	3.52E-09
	1.4191	1.5975	1.1574	1.5040	1.1152	1.5688	1.2318	2.2272	1.3751	.9937	1.7252
	3.11E-01	2.35E-01	9.92E-02	3.03E-01	6.94E-02	2.60E-01	1.66E-01	9.05E-05	2.92E-01	1.89E-02	1.13E-01
	3.07E+06	(9.11E+04)(	1.66E+03)(	4.48E+03)(	2.14E+01)(	7.17E+01)(	8.69E+00)(	4.03E-08)(	1.66E+00)(	4.67E-04)(	3.66E-03)
	3.23E+06	2.82E+05*	1.30E+04*	1.18E+04*	1.79E+02*	3.94E+02*	2.58E+01*	9.64E+00*	3.88E+00*	9.54E-04*	2.37E-01*
5	.1906	.1974	.2046	.2121	.2200	.2283	.2370	.2462	.2559	.2661	.2768
	52455.7	50653.5	48887.2	47157.4	45464.6	43809.5	42192.7	40615.1	39077.3	37580.1	36124.0
	3.01E-01	1.53E-01	7.51E-03	1.79E-03	3.05E-04	8.57E-05	5.54E-06	6.92E-06	5.92E-08	3.28E-07	1.04E-07
	1.3735	1.4285	1.6426	1.2243	1.5754	1.2231	1.7815	1.3212	.2081	1.4935	1.2249
	2.91E-01	3.13E-01	1.91E-01	1.58E-01	2.55E-01	1.57E-01	7.15E-02	2.52E-01	2.85E-10	3.07E-01	1.59E-01
	7.47E+06	3.94E+06	(6.48E+04)(	9.54E+03)(	3.77E+03)(	3.61E+02)(	4.30E+00)(	5.96E+01)(	5.82E-19)(	3.32E+00)(	2.51E-01)
	6.96E+06	4.09E+06	3.09E+05*	3.79E+04*	1.67E+04*	1.25E+03*	5.44E+02*	1.35E+02*	5.19E+00*	1.21E+01*	6.96E-01*
6	.1839	.1902	.1968	.2038	.2111	.2187	.2267	.2351	.2440	.2532	.2629
	54369.4	52567.2	50800.9	49071.1	47378.3	45723.2	44106.4	42528.8	40991.0	39493.8	38037.7
	3.65E-02	3.12E-01	1.81E-01	6.92E-03	3.34E-03	2.61E-04	1.98E-04	7.76E-07	1.35E-05	1.22E-06	2.54E-07
	1.4108	1.3842	1.4388	1.7055	1.2742	1.6929	1.2945	3.0289	1.3998	1.0457	1.7345
	3.09E-01	2.97E-01	3.14E-01	1.30E-01	2.08E-01	1.42E-01	2.27E-01	7.63E-16	3.04E-01	3.47E-02	1.06E-01
	(1.13E+06)(	8.10E+06)	4.76E+06	(2.82E+04)(	3.10E+04)(	1.02E+03)(	1.78E+03)(	7.04E-29)(	1.74E+02)(	1.83E-01)(	3.16E-01)
	9.59E+05	7.32E+06	4.86E+06	2.93E+05*	8.45E+04*	1.86E+04*	4.28E+03*	4.51E+02*	3.96E+02*	1.04E+00*	2.12E+01*
7	.1778	.1837	.1898	.1963	.2030	.2101	.2175	.2252	.2333	.2417	.2505
	56247.8	54445.5	52679.3	50949.5	49256.7	47601.5	45984.8	44407.1	42869.4	41372.2	39916.1
	6.51E-02	1.69E-02	3.18E-01	2.06E-01	5.46E-03	5.42E-03	1.36E-04	3.56E-04	3.98E-06	1.79E-05	5.34E-06
	1.2502	1.4893	1.3962	1.4499	1.8004	1.3148	1.9604	1.3521	.4211	1.4921	1.2238
	1.84E-01	3.09E-01	3.03E-01	3.15E-01	6.00E-02	2.46E-01	9.35E-03	2.77E-01	1.96E-07	3.08E-01	1.58E-01
	(7.92E+05)	5.25E+05	(8.65E+06)	5.48E+06	(4.76E+03)(	7.17E+04)(	2.34E+00)(	4.83E+03)(	2.44E-11)(	2.43E+02)(	1.72E+01)
	9.83E+05	5.20E+05	7.55E+06	5.50E+06	2.35E+05*	1.56E+05*	1.55E+04*	1.00E+04*	1.13E+02*	7.73E+02*	5.39E+01*

Table 16. Radiative transition parameters for N_2^+ $C\ ^2\Sigma_u^+ - X\ ^2\Sigma_g^+$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.1247	.1282	.1318	.1356	.1395	.1436	.1479	.1523	.1570	.1618	.1669
	80180.5	78005.6	75863.4	73753.9	71677.4	69634.2	67624.4	65648.3	63706.3	61798.7	59925.9
	7.04E-02	6.65E-02	5.37E-04	5.49E-02	7.68E-03	3.43E-02	2.33E-02	1.72E-02	3.75E-02	6.14E-03	4.96E-02
	1.0888	1.1028	1.0869	1.1267	1.1486	1.1514	1.1729	1.1752	1.2017	1.1905	1.2330
	5.41E-02	6.19E-02	5.31E-02	7.68E-02	9.24E-02	9.45E-02	1.12E-01	1.14E-01	1.37E-01	1.27E-01	1.67E-01
	2.15E+05	2.45E+05 (1.34E+03)	2.63E+05	(4.89E+04)	2.10E+05	1.82E+05	1.27E+05	3.68E+05	(4.73E+04)	6.02E+05	
	2.09E+05	2.52E+05	2.58E+02*	2.61E+05	5.89E+04*	1.99E+05	1.99E+05	1.16E+05	3.85E+05	4.04E+04*	6.20E+05
9	.1220	.1253	.1288	.1324	.1361	.1400	.1440	.1483	.1527	.1572	.1620
	81980.3	79805.4	77663.1	75553.7	73477.2	71434.0	69424.2	67448.1	65506.1	63598.5	61725.6
	4.85E-02	7.51E-02	5.90E-03	3.25E-02	3.31E-02	4.66E-03	4.40E-02	1.08E-03	3.75E-02	1.33E-02	2.29E-02
	1.0789	1.0921	1.1116	1.1138	1.1312	1.1306	1.1557	1.2010	1.1813	1.2099	1.2051
	4.91E-02	5.59E-02	6.71E-02	6.85E-02	7.99E-02	7.95E-02	9.78E-02	1.36E-01	1.19E-01	1.45E-01	1.40E-01
	1.30E+05	2.41E+05 (2.52E+04)	1.33E+05	1.70E+05	(2.17E+04)	2.86E+05	(1.25E+04)	3.01E+05	1.45E+05	2.15E+05	
	1.25E+05	2.44E+05	3.12E+04*	1.24E+05	1.81E+05	1.57E+04*	2.90E+05	1.80E+04*	2.96E+05	1.60E+05	2.06E+05
10	.1194	.1226	.1259	.1293	.1329	.1366	.1405	.1445	.1487	.1530	.1575
	83737.1	81562.2	79420.0	77310.5	75234.1	73190.8	71181.0	69204.9	67262.9	65355.3	63482.5
	3.21E-02	7.17E-02	2.29E-02	9.49E-03	4.50E-02	3.05E-03	2.83E-02	2.39E-02	6.04E-03	3.87E-02	6.54E-04
	1.0696	1.0822	1.0971	1.0997	1.1183	1.1441	1.1407	1.1607	1.1578	1.1856	1.2602
	4.47E-02	5.07E-02	5.86E-02	6.01E-02	7.13E-02	8.91E-02	8.66E-02	1.02E-01	9.95E-02	1.23E-01	1.94E-01
	7.62E+04	2.03E+05	7.99E+04 (3.21E+04)	1.98E+05	(1.92E+04)	1.55E+05	1.66E+05	(3.69E+04)	3.29E+05	(1.27E+04)	
	7.21E+04	2.01E+05	8.81E+04	2.59E+04*	2.00E+05	2.58E+04*	1.46E+05	1.80E+05	2.92E+04*	3.37E+05	1.75E+04*

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	.1722	.1777	.1834	.1894	.1957	.2023	.2091	.2162	.2237	.2314	.2395
	58088.1	56285.9	54519.6	52789.8	51097.0	49441.9	47825.1	46247.5	44709.7	43212.6	41756.4
	8.08E-04	6.18E-02	6.59E-03	3.24E-01	2.27E-01	3.51E-03	7.81E-03	1.40E-05	5.14E-04	3.89E-05	1.47E-05
	1.1275	1.2519	1.6474	1.4095	1.4619	1.9625	1.3500	3.6013	1.4065	1.0314	1.6456
	7.74E-02	1.85E-01	1.86E-01	3.08E-01	3.14E-01	9.09E-03	2.75E-01	2.31E-28	3.07E-01	2.96E-02	1.88E-01
	(1.92E+03)(	7.68E+05)(	7.50E+04)(	9.15E+06)	6.08E+06	(7.10E+01)(	1.31E+05)(	0.00E+00)(	8.78E+03)(	5.56E+00)(	7.67E+01)
	1.67E+02*	1.00E+06	2.55E+05*	7.69E+06	5.99E+06	1.53E+05*	2.50E+05*	8.14E+03*	1.81E+04*	1.01E+02*	1.04E+03*
9	.1670	.1722	.1776	.1832	.1890	.1952	.2015	.2081	.2150	.2222	.2296
	59887.9	58085.7	56319.4	54589.6	52896.8	51241.7	49624.9	48047.3	46509.5	45012.3	43556.2
	3.23E-02	8.72E-03	5.19E-02	1.92E-03	3.29E-01	2.45E-01	1.61E-03	1.02E-02	5.25E-05	5.99E-04	1.30E-04
	1.2384	1.2140	1.2521	2.0316	1.4238	1.4747	2.3096	1.3826	.0716	1.4660	1.1973
	1.72E-01	1.49E-01	1.86E-01	3.27E-03	3.12E-01	3.12E-01	1.47E-05	2.96E-01	2.28E-12	3.14E-01	1.33E-01
	4.16E+05	(7.64E+04)(	6.48E+05)(	6.79E+00)(	9.61E+06)	6.52E+06	(8.58E-05)(	2.01E+05)(	5.58E-20)(	1.09E+04)(	3.86E+02)
	4.37E+05	6.49E+04*	9.12E+05	1.06E+05*	7.75E+06	6.31E+06	6.87E+04*	3.54E+05	1.05E+03*	2.59E+04*	1.62E+03*
10	.1622	.1671	.1722	.1775	.1830	.1887	.1946	.2008	.2072	.2138	.2207
	61644.7	59842.5	58076.2	56346.4	54653.6	52998.5	51381.7	49804.1	48266.3	46769.2	45313.1
	3.57E-02	1.50E-02	1.95E-02	3.98E-02	2.63E-04	3.35E-01	2.59E-01	2.99E-04	1.22E-02	4.19E-04	5.48E-04
	1.2109	1.2469	1.2281	1.2511	3.5337	1.4392	1.4883	3.6530	1.4147	.8852	1.5437
	1.46E-01	1.80E-01	1.62E-01	1.85E-01	1.10E-26	3.15E-01	3.09E-01	1.11E-29	3.10E-01	4.25E-03	2.80E-01
	3.59E+05	2.12E+05	2.03E+05	(4.91E+05)(	0.00E+00)(	1.00E+07)	6.78E+06	(0.00E+00)(	2.67E+05)(	1.56E+00)(	8.09E+03)
	3.56E+05	2.30E+05	1.87E+05	7.74E+05	3.04E+04*	7.75E+06	6.44E+06	1.07E+04*	4.53E+05	2.15E+03*	3.01E+04*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.2496	.2618	.2751	.2895	.3051	.3223	.3411	.3617	.3846	.4100	.4384
	40068.1	38195.0	36354.7	34547.2	32772.4	31030.3	29320.7	27643.7	25999.3	24387.4	22808.2
	1.60E-06	3.00E-05	2.66E-04	1.50E-03	5.96E-03	1.79E-02	4.22E-02	7.98E-02	1.23E-01	1.58E-01	1.69E-01
	1.2432	1.2583	1.2738	1.2897	1.3061	1.3230	1.3405	1.3585	1.3772	1.3967	1.4169
	1.92E-01	1.97E-01	2.01E-01	2.07E-01	2.12E-01	2.18E-01	2.25E-01	2.32E-01	2.40E-01	2.49E-01	2.59E-01
	7.69E+00	1.31E+02	1.05E+03	5.33E+03	1.91E+04	5.17E+04	1.09E+05	1.84E+05	2.54E+05	2.89E+05	2.72E+05
	7.76E+00*	1.32E+02*	1.06E+03*	5.37E+03*	1.93E+04*	5.19E+04	1.10E+05	1.85E+05	2.55E+05	2.89E+05	2.72E+05
1	.2443	.2560	.2686	.2823	.2972	.3135	.3312	.3507	.3721	.3959	.4223
	40939.7	39066.6	37226.3	35418.9	33644.1	31901.9	30192.3	28515.3	26870.9	25259.1	23679.8
	1.31E-05	2.13E-04	1.60E-03	7.44E-03	2.36E-02	5.37E-02	8.90E-02	1.06E-01	8.43E-02	3.51E-02	1.18E-03
	1.2362	1.2510	1.2661	1.2816	1.2975	1.3139	1.3307	1.3480	1.3656	1.3829	1.3855
	1.90E-01	1.94E-01	1.99E-01	2.04E-01	2.09E-01	2.15E-01	2.21E-01	2.28E-01	2.35E-01	2.43E-01	2.44E-01
	6.57E+01	9.70E+02	6.64E+03	2.78E+04	7.97E+04	1.63E+05	2.43E+05	2.59E+05	1.84E+05	6.77E+04	1.88E+03
	6.62E+01*	9.76E+02*	6.68E+03*	2.80E+04*	8.01E+04	1.64E+05	2.44E+05	2.59E+05	1.83E+05	6.70E+04	1.75E+03*
2	.2393	.2506	.2627	.2758	.2900	.3054	.3222	.3406	.3608	.3831	.4078
	41784.0	39910.9	38070.6	36263.1	34488.3	32746.2	31036.6	29359.6	27715.2	26103.3	24524.1
	5.67E-05	7.99E-04	5.11E-03	1.94E-02	4.80E-02	7.91E-02	8.32E-02	4.64E-02	4.84E-03	1.09E-02	5.75E-02
	1.2296	1.2440	1.2588	1.2739	1.2894	1.3052	1.3213	1.3373	1.3486	1.3812	1.3962
	1.88E-01	1.92E-01	1.97E-01	2.01E-01	2.06E-01	2.12E-01	2.18E-01	2.24E-01	2.28E-01	2.42E-01	2.49E-01
	2.97E+02	3.80E+03	2.21E+04	7.60E+04	1.70E+05	2.53E+05	2.39E+05	1.19E+05	1.09E+04	2.30E+04	1.06E+05
	2.99E+02*	3.83E+03*	2.22E+04*	7.63E+04	1.71E+05	2.53E+05	2.39E+05	1.19E+05	1.06E+04*	2.35E+04	1.07E+05
3	.2347	.2455	.2572	.2697	.2832	.2979	.3139	.3314	.3505	.3715	.3946
	42600.9	40727.8	38887.6	37080.1	35305.3	33563.1	31853.5	30176.5	28532.1	26920.3	25341.0
	1.73E-04	2.12E-03	1.14E-02	3.52E-02	6.60E-02	7.30E-02	3.80E-02	1.64E-03	1.76E-02	5.71E-02	4.69E-02
	1.2232	1.2374	1.2518	1.2665	1.2816	1.2968	1.3118	1.3172	1.3516	1.3666	1.3829
	1.86E-01	1.90E-01	1.95E-01	1.99E-01	2.04E-01	2.09E-01	2.14E-01	2.16E-01	2.30E-01	2.36E-01	2.43E-01
	9.44E+02	1.05E+04	5.15E+04	1.44E+05	2.45E+05	2.44E+05	1.14E+05	4.26E+03	4.37E+04	1.25E+05	9.13E+04
	9.50E+02*	1.06E+04*	5.18E+04	1.44E+05	2.45E+05	2.44E+05	1.14E+05	4.05E+03*	4.43E+04	1.26E+05	9.08E+04
4	.2305	.2409	.2520	.2641	.2770	.2911	.3063	.3229	.3410	.3609	.3827
	43390.6	41517.5	39677.3	37869.8	36095.0	34352.8	32643.3	30966.3	29321.8	27710.0	26130.7
	4.20E-04	4.45E-03	2.02E-02	4.96E-02	6.77E-02	4.34E-02	4.08E-03	1.26E-02	4.86E-02	3.53E-02	8.16E-04
	1.2172	1.2311	1.2452	1.2596	1.2741	1.2886	1.2985	1.3265	1.3400	1.3550	1.3502
	1.85E-01	1.89E-01	1.93E-01	1.97E-01	2.01E-01	2.06E-01	2.10E-01	2.20E-01	2.25E-01	2.31E-01	2.29E-01
	2.37E+03	2.30E+04	9.47E+04	2.11E+05	2.62E+05	1.52E+05	1.26E+04	3.66E+04	1.26E+05	8.11E+04	(1.55E+03)
	2.39E+03*	2.31E+04*	9.51E+04	2.12E+05	2.62E+05	1.51E+05	1.23E+04*	3.72E+04	1.26E+05	8.05E+04	1.40E+03*
5	.2265	.2365	.2473	.2589	.2713	.2848	.2993	.3152	.3324	.3512	.3718
	44153.1	42280.0	40439.8	38632.3	36857.5	35115.3	33405.8	31728.8	30084.3	28472.5	26893.2
	8.59E-04	7.89E-03	2.99E-02	5.75E-02	5.34E-02	1.37E-02	3.55E-03	3.76E-02	3.58E-02	1.72E-03	1.98E-02
	1.2115	1.2252	1.2390	1.2530	1.2669	1.2796	1.3062	1.3158	1.3299	1.3332	1.3699
	1.83E-01	1.87E-01	1.91E-01	1.95E-01	1.99E-01	2.03E-01	2.12E-01	2.16E-01	2.21E-01	2.22E-01	2.37E-01
	5.04E+03	4.23E+04	1.46E+05	2.55E+05	2.15E+05	4.97E+04	1.21E+04	1.13E+05	9.65E+04	3.97E+03	4.39E+04
	5.06E+03*	4.24E+04*	1.46E+05	2.56E+05	2.15E+05	4.92E+04	1.24E+04*	1.14E+05	9.60E+04	3.75E+03*	4.45E+04
6	.2228	.2325	.2429	.2540	.2660	.2789	.2929	.3080	.3245	.3424	.3619
	44888.5	43015.4	41175.2	39367.7	37592.9	35850.7	34141.1	32464.1	30819.7	29207.9	27628.6
	1.54E-03	1.23E-02	3.87E-02	5.68E-02	3.18E-02	4.03E-04	2.13E-02	3.91E-02	7.63E-03	9.66E-03	3.91E-02
	1.2060	1.2195	1.2331	1.2466	1.2598	1.2550	1.2939	1.3071	1.3179	1.3461	1.3580
	1.82E-01	1.85E-01	1.89E-01	1.93E-01	1.97E-01	1.96E-01	2.08E-01	2.13E-01	2.16E-01	2.27E-01	2.32E-01
	9.37E+03	6.82E+04	1.96E+05	2.62E+05	1.33E+05	1.44E+03	7.44E+04	1.22E+05	2.12E+04	2.52E+04	9.01E+04
	9.42E+03*	6.85E+04	1.96E+05	2.62E+05	1.32E+05	1.33E+03*	7.50E+04	1.22E+05	2.07E+04*	2.57E+04*	9.02E+04
7	.2193	.2287	.2388	.2495	.2611	.2735	.2869	.3015	.3172	.3343	.3529
	45596.8	43723.7	41883.5	40076.0	38301.2	36559.0	34849.4	33172.4	31528.0	29916.2	28336.9
	2.51E-03	1.73E-02	4.48E-02	4.85E-02	1.27E-02	4.16E-03	3.41E-02	2.06E-02	7.94E-04	2.98E-02	2.16E-02
	1.2009	1.2142	1.2274	1.2406	1.2523	1.2762	1.2859	1.2984	1.3363	1.3344	1.3472
	1.81E-01	1.84E-01	1.88E-01	1.91E-01	1.95E-01	2.02E-01	2.05E-01	2.10E-01	2.23E-01	2.23E-01	2.28E-01
	1.57E+04	9.91E+04	2.35E+05	2.31E+05	5.49E+04	1.68E+04	1.23E+05	6.70E+04	2.52E+03	8.02E+04	5.17E+04
	1.58E+04*	9.95E+04	2.35E+05	2.31E+05	5.44E+04	1.72E+04*	1.23E+05	6.64E+04	2.69E+03*	8.06E+04	5.12E+04

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	.4703	.5064	.5474	.5946	.6492	.7132	.7891	.8805	.9925	1.1328	1.3134
	21261.6	19747.7	18266.6	16818.4	15403.2	14021.2	12672.5	11357.2	10075.5	8827.7	7614.0
	1.51E-01	1.14E-01	7.22E-02	3.84E-02	1.72E-02	6.39E-03	1.97E-03	4.96E-04	1.01E-04	1.64E-05	2.05E-06
	1.4379	1.4600	1.4831	1.5075	1.5333	1.5608	1.5903	1.6220	1.6567	1.6949	1.7379
	2.70E-01	2.82E-01	2.95E-01	3.10E-01	3.27E-01	3.46E-01	3.68E-01	3.94E-01	4.24E-01	4.59E-01	5.03E-01
	2.14E+05	1.41E+05	7.75E+04	3.56E+04	1.36E+04	4.27E+03	1.10E+03	2.28E+02	3.76E+01	4.81E+00	4.64E-01
	2.14E+05	1.41E+05	7.72E+04	3.54E+04	1.35E+04	4.23E+03*	1.08E+03*	2.25E+02*	3.69E+01*	4.70E+00*	4.51E-01*
1	.4518	.4850	.5225	.5653	.6144	.6715	.7383	.8177	.9135	1.0310	1.1785
	22133.2	20619.3	19138.2	17690.0	16274.9	14892.8	13544.1	12228.8	10947.1	9699.3	8485.6
	1.77E-02	7.51E-02	1.28E-01	1.41E-01	1.13E-01	7.01E-02	3.41E-02	1.32E-02	4.04E-03	9.76E-04	1.83E-04
	1.4314	1.4498	1.4712	1.4941	1.5185	1.5444	1.5721	1.6017	1.6338	1.6689	1.7076
	2.66E-01	2.76E-01	2.88E-01	3.02E-01	3.17E-01	3.34E-01	3.54E-01	3.77E-01	4.03E-01	4.35E-01	4.72E-01
	2.76E+04	1.02E+05	1.51E+05	1.44E+05	9.94E+04	5.24E+04	2.15E+04	6.94E+03	1.75E+03	3.41E+02	5.05E+01
	2.81E+04	1.02E+05	1.51E+05	1.44E+05	9.91E+04	5.22E+04	2.14E+04	6.87E+03	1.72E+03*	3.35E+02*	4.94E+01*
2	.4352	.4659	.5004	.5395	.5841	.6354	.6950	.7649	.8481	.9484	1.0718
	22977.5	21463.6	19982.5	18534.3	17119.1	15737.1	14388.3	13073.0	11791.4	10543.6	9329.8
	7.77E-02	4.11E-02	1.64E-03	2.15E-02	8.72E-02	1.35E-01	1.29E-01	8.66E-02	4.33E-02	1.65E-02	4.77E-03
	1.4143	1.4326	1.4345	1.4866	1.5065	1.5302	1.5560	1.5837	1.6136	1.6460	1.6814
	2.58E-01	2.67E-01	2.68E-01	2.97E-01	3.09E-01	3.25E-01	3.43E-01	3.63E-01	3.87E-01	4.14E-01	4.46E-01
	1.27E+05	5.86E+04	1.90E+03	2.45E+04	8.48E+04	1.12E+05	9.10E+04	5.16E+04	2.15E+04	6.70E+03	1.56E+03
	1.27E+05	5.81E+04	1.74E+03*	2.50E+04	8.54E+04	1.12E+05	9.09E+04	5.14E+04	2.13E+04	6.63E+03	1.54E+03*
3	.4203	.4488	.4808	.5168	.5575	.6041	.6577	.7199	.7931	.8802	.9855
	23794.4	22280.5	20799.5	19351.3	17936.1	16554.0	15205.3	13890.0	12608.3	11360.5	10146.8
	5.23E-03	1.39E-02	6.27E-02	6.38E-02	1.52E-02	5.65E-03	6.59E-02	1.29E-01	1.34E-01	9.13E-02	4.42E-02
	1.3935	1.4307	1.4465	1.4656	1.4821	1.5308	1.5439	1.5685	1.5960	1.6260	1.6586
	2.48E-01	2.66E-01	2.74E-01	2.85E-01	2.94E-01	3.25E-01	3.34E-01	3.52E-01	3.72E-01	3.97E-01	4.25E-01
	8.76E+03	2.21E+04	8.59E+04	7.60E+04	1.54E+04	5.49E+03	5.24E+04	8.64E+04	7.53E+04	4.27E+04	1.69E+04
	8.43E+03*	2.26E+04	8.63E+04	7.57E+04	1.50E+04	5.77E+03*	5.31E+04	8.68E+04	7.52E+04	4.25E+04	1.68E+04
4	.4068	.4335	.4632	.4965	.5340	.5766	.6252	.6812	.7464	.8230	.9144
	24584.1	23070.2	21589.2	20141.0	18725.8	17343.7	15995.0	14679.7	13398.0	12150.2	10936.5
	2.37E-02	5.50E-02	2.37E-02	1.38E-03	4.56E-02	6.87E-02	2.34E-02	2.74E-03	6.28E-02	1.31E-01	1.35E-01
	1.3977	1.4134	1.4291	1.4824	1.4802	1.4995	1.5177	1.5792	1.5833	1.6093	1.6390
	2.50E-01	2.57E-01	2.65E-01	2.94E-01	2.93E-01	3.05E-01	3.16E-01	3.60E-01	3.63E-01	3.83E-01	4.08E-01
	4.45E+04	9.05E+04	3.39E+04	1.98E+03	5.21E+04	6.75E+04	1.94E+04	2.27E+03	4.03E+04	7.01E+04	5.94E+04
	4.52E+04	9.05E+04	3.34E+04	2.16E+03*	5.27E+04	6.74E+04	1.90E+04	2.46E+03*	4.09E+04	7.04E+04	5.93E+04
5	.3945	.4196	.4474	.4784	.5131	.5523	.5967	.6476	.7062	.7744	.8548
	25346.6	23832.8	22351.7	20903.5	19488.3	18106.3	16757.5	15442.2	14160.6	12912.8	11699.0
	4.52E-02	1.25E-02	7.19E-03	4.84E-02	3.34E-02	5.45E-06	3.91E-02	6.87E-02	2.26E-02	4.66E-03	7.45E-02
	1.3842	1.3971	1.4332	1.4448	1.4613	2.0027	1.5152	1.5348	1.5530	1.6157	1.6245
	2.44E-01	2.49E-01	2.67E-01	2.73E-01	2.82E-01	8.46E-01	3.15E-01	3.28E-01	3.40E-01	3.88E-01	3.96E-01
	8.85E+04	2.14E+04	1.16E+04	6.69E+04	3.99E+04	4.70E+01	3.70E+04	5.51E+04	1.50E+04	3.06E+03	3.78E+04
	8.84E+04	2.09E+04	1.20E+04*	6.72E+04	3.94E+04	4.89E+01*	3.75E+04	5.50E+04	1.46E+04	3.28E+03*	3.84E+04
6	.3834	.4070	.4331	.4621	.4945	.5307	.5717	.6181	.6713	.7327	.8042
	26082.0	24568.1	23087.1	21638.9	20223.7	18841.6	17492.9	16177.6	14895.9	13648.1	12434.4
	1.38E-02	5.49E-03	4.09E-02	2.09E-02	2.64E-03	4.40E-02	3.48E-02	1.36E-05	4.23E-02	6.67E-02	1.45E-02
	1.3705	1.4043	1.4141	1.4282	1.4739	1.4772	1.4939	1.9035	1.5511	1.5714	1.5870
	2.37E-01	2.53E-01	2.58E-01	2.65E-01	2.90E-01	2.91E-01	3.01E-01	7.03E-01	3.39E-01	3.54E-01	3.66E-01
	2.81E+04	1.05E+04	6.76E+04	3.00E+04	3.71E+03	5.07E+04	3.43E+04	(5.76E+01)	3.25E+04	4.30E+04	7.53E+03
	2.75E+04	1.09E+04*	6.78E+04	2.95E+04	3.95E+03*	5.10E+04	3.39E+04	6.83E+01*	3.30E+04	4.28E+04	7.22E+03
7	.3733	.3956	.4203	.4475	.4777	.5115	.5494	.5922	.6409	.6966	.7609
	26790.3	25276.4	23795.4	22347.2	20932.0	19549.9	18201.2	16885.9	15604.2	14356.4	13142.7
	8.04E-04	3.18E-02	2.13E-02	1.65E-03	3.70E-02	2.25E-02	2.48E-03	4.47E-02	3.02E-02	1.21E-03	5.28E-02
	1.3927	1.3869	1.4001	1.4458	1.4448	1.4589	1.5097	1.5105	1.5269	1.6050	1.5882
	2.47E-01	2.45E-01	2.51E-01	2.74E-01	2.73E-01	2.81E-01	3.11E-01	3.12E-01	3.22E-01	3.80E-01	3.66E-01
	1.92E+03	6.22E+04	3.66E+04	2.80E+03	5.13E+04	2.69E+04	2.94E+03	4.24E+04	2.42E+04	(1.04E+03)	3.26E+04
	2.08E+03*	6.26E+04	3.61E+04	3.01E+03*	5.16E+04	2.65E+04	3.16E+03*	4.27E+04	2.37E+04	1.17E+03*	3.30E+04

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi'_{v'} R_e(r) \psi_{v''} dr$. – Continued

V'\V"	0	1	2	3	4	5	6	7	8	9	10
8	.2161	.2252	.2349	.2454	.2565	.2685	.2814	.2954	.3105	.3268	.3446
	46278.1	44405.0	42564.7	40757.2	38982.4	37240.3	35530.7	33853.7	32209.3	30597.4	29018.2
	3.75E-03	2.23E-02	4.72E-02	3.57E-02	2.00E-03	1.58E-02	3.21E-02	3.79E-03	1.35E-02	2.95E-02	1.74E-03
	1.1959	1.2091	1.2221	1.2347	1.2412	1.2666	1.2786	1.2868	1.3135	1.3253	1.3275
	1.79E-01	1.83E-01	1.86E-01	1.90E-01	1.91E-01	1.99E-01	2.03E-01	2.06E-01	2.15E-01	2.19E-01	2.20E-01
	2.43E+04	1.32E+05	2.56E+05	1.76E+05	8.78E+03	6.54E+04	1.20E+05	1.26E+04	4.23E+04	8.22E+04	4.17E+03
	2.44E+04*	1.33E+05	2.56E+05	1.76E+05	8.53E+03*	6.60E+04	1.20E+05	1.22E+04*	4.29E+04	8.20E+04	3.93E+03*
9	.2131	.2219	.2314	.2415	.2523	.2639	.2764	.2898	.3043	.3200	.3370
	46932.4	45059.3	43219.0	41411.5	39636.7	37894.5	36185.0	34508.0	32863.6	31251.7	29672.5
	5.24E-03	2.69E-02	4.60E-02	2.23E-02	3.19E-04	2.55E-02	2.02E-02	4.76E-04	2.54E-02	1.35E-02	3.90E-03
	1.1913	1.2043	1.2170	1.2290	1.2660	1.2598	1.2714	1.3101	1.3047	1.3159	1.3450
	1.78E-01	1.82E-01	1.85E-01	1.88E-01	1.99E-01	1.97E-01	2.01E-01	2.14E-01	2.12E-01	2.16E-01	2.27E-01
	3.49E+04	1.65E+05	2.57E+05	1.13E+05	1.59E+03	1.09E+05	7.80E+04	1.81E+03	8.20E+04	3.88E+04	1.06E+04
	3.51E+04*	1.65E+05	2.57E+05	1.13E+05	1.70E+03*	1.09E+05	7.75E+04	1.95E+03*	8.23E+04	3.83E+04	1.10E+04*
10	.2103	.2189	.2281	.2379	.2484	.2596	.2716	.2846	.2986	.3137	.3300
	47559.7	45686.6	43846.3	42038.8	40264.0	38521.9	36812.3	35135.3	33490.9	31879.0	30299.8
	6.93E-03	3.07E-02	4.16E-02	1.12E-02	4.84E-03	2.83E-02	7.66E-03	7.83E-03	2.51E-02	1.35E-03	1.70E-02
	1.1868	1.1998	1.2123	1.2231	1.2445	1.2536	1.2635	1.2870	1.2972	1.2987	1.3318
	1.77E-01	1.80E-01	1.84E-01	1.86E-01	1.92E-01	1.95E-01	1.98E-01	2.06E-01	2.09E-01	2.10E-01	2.22E-01
	4.75E+04	1.93E+05	2.40E+05	5.84E+04	2.37E+04	1.25E+05	3.04E+04	2.91E+04	8.35E+04	3.88E+03	4.72E+04
	4.77E+04*	1.94E+05	2.39E+05	5.79E+04	2.41E+04*	1.25E+05	2.99E+04*	2.95E+04*	8.33E+04	3.67E+03*	4.77E+04
11	.2076	.2160	.2250	.2345	.2447	.2556	.2673	.2798	.2933	.3079	.3236
	48160.2	46287.0	44446.8	42639.3	40864.5	39122.3	37412.8	35735.8	34091.3	32479.5	30900.2
	8.75E-03	3.34E-02	3.52E-02	3.83E-03	1.16E-02	2.45E-02	8.00E-04	1.69E-02	1.55E-02	1.59E-03	2.31E-02
	1.1826	1.1955	1.2077	1.2162	1.2375	1.2479	1.2474	1.2791	1.2898	1.3200	1.3233
	1.76E-01	1.79E-01	1.82E-01	1.85E-01	1.90E-01	1.93E-01	1.93E-01	2.03E-01	2.07E-01	2.17E-01	2.18E-01
	6.15E+04	2.16E+05	2.09E+05	2.05E+04	5.83E+04	1.11E+05	3.17E+03	6.44E+04	5.32E+04	5.22E+03	6.58E+04
	6.17E+04*	2.16E+05	2.08E+05	2.02E+04*	5.87E+04	1.11E+05	3.00E+03*	6.49E+04	5.28E+04	5.46E+03*	6.59E+04
12	.2052	.2134	.2221	.2314	.2413	.2519	.2633	.2754	.2885	.3025	.3177
	48733.8	46860.7	45020.4	43212.9	41438.1	39696.0	37986.4	36309.4	34665.0	33053.1	31473.9
	1.06E-02	3.47E-02	2.79E-02	4.28E-04	1.75E-02	1.71E-02	6.79E-04	2.12E-02	5.35E-03	9.40E-03	1.77E-02
	1.1786	1.1914	1.2034	1.2014	1.2320	1.2422	1.2742	1.2726	1.2812	1.3057	1.3156
	1.75E-01	1.78E-01	1.81E-01	1.81E-01	1.89E-01	1.92E-01	2.01E-01	2.01E-01	2.04E-01	2.12E-01	2.16E-01
	7.65E+04	2.31E+05	1.70E+05	2.29E+03	8.99E+04	7.95E+04	3.06E+03	8.32E+04	1.87E+04	3.09E+04	5.20E+04
	7.68E+04	2.31E+05	1.69E+05	2.17E+03*	9.03E+04	7.91E+04	3.22E+03*	8.33E+04	1.83E+04*	3.14E+04*	5.17E+04
13	.2029	.2109	.2195	.2285	.2382	.2485	.2595	.2713	.2840	.2976	.3123
	49280.6	47407.5	45567.3	43759.8	41985.0	40242.8	38533.2	36856.2	35211.8	33600.0	32020.7
	1.24E-02	3.49E-02	2.07E-02	2.52E-04	2.07E-02	9.31E-03	4.88E-03	1.95E-02	3.01E-04	1.63E-02	7.87E-03
	1.1747	1.1876	1.1993	1.2329	1.2271	1.2364	1.2587	1.2667	1.2555	1.2981	1.3073
	1.74E-01	1.77E-01	1.80E-01	1.89E-01	1.88E-01	1.90E-01	1.97E-01	1.99E-01	1.96E-01	2.09E-01	2.13E-01
	9.18E+04	2.38E+05	1.29E+05	1.53E+03	1.09E+05	4.44E+04	2.19E+04	7.83E+04	(1.02E+03)	5.51E+04	2.37E+04
	9.21E+04	2.38E+05	1.28E+05	1.62E+03*	1.10E+05	4.40E+04*	2.22E+04*	7.82E+04	9.16E+02*	5.54E+04	2.33E+04*
14	.2008	.2086	.2170	.2258	.2353	.2453	.2561	.2675	.2799	.2931	.3073
	49800.8	47927.7	46087.4	44279.9	42505.1	40763.0	39053.4	37376.4	35732.0	34120.1	32540.9
	1.42E-02	3.40E-02	1.42E-02	2.18E-03	2.10E-02	3.52E-03	1.01E-02	1.39E-02	1.09E-03	1.79E-02	1.18E-03
	1.1711	1.1840	1.1955	1.2156	1.2227	1.2295	1.2520	1.2610	1.2903	1.2918	1.2928
	1.74E-01	1.77E-01	1.79E-01	1.84E-01	1.86E-01	1.88E-01	1.95E-01	1.97E-01	2.07E-01	2.07E-01	2.08E-01
	1.07E+05	2.37E+05	9.07E+04	1.31E+04	1.14E+05	1.71E+04	4.62E+04	5.71E+04	4.30E+03	6.18E+04	3.54E+03
	1.07E+05	2.37E+05	9.02E+04	1.33E+04*	1.14E+05	1.68E+04*	4.66E+04	5.68E+04	4.49E+03*	6.18E+04	3.34E+03*
15	.1988	.2065	.2147	.2233	.2326	.2424	.2529	.2641	.2760	.2889	.3027
	50294.3	48421.2	46581.0	44773.5	42998.7	41256.5	39547.0	37870.0	36225.5	34613.7	33034.4
	1.57E-02	3.23E-02	8.93E-03	5.10E-03	1.89E-02	5.35E-04	1.40E-02	7.52E-03	5.20E-03	1.44E-02	3.20E-04
	1.1677	1.1806	1.1918	1.2094	1.2185	1.2151	1.2467	1.2550	1.2778	1.2858	1.3283
	1.73E-01	1.76E-01	1.78E-01	1.83E-01	1.85E-01	1.84E-01	1.93E-01	1.96E-01	2.03E-01	2.05E-01	2.20E-01
	1.21E+05	2.30E+05	5.82E+04	3.10E+04	1.05E+05	2.59E+03	6.52E+04	3.16E+04	2.06E+04	5.09E+04	1.13E+03
	1.22E+05	2.30E+05	5.78E+04*	3.13E+04*	1.05E+05	2.46E+03*	6.55E+04	3.13E+04*	2.09E+04*	5.06E+04	1.24E+03*

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v''	11	12	13	14	15	16	17	18	19	20	21
8	.3640	.3852	.4086	.4342	.4627	.4943	.5296	.5692	.6140	.6650	.7234
	27471.6	25957.7	24476.6	23028.4	21613.2	20231.2	18882.4	17567.1	16285.5	15037.7	13824.0
	1.85E-02	2.69E-02	3.21E-05	2.69E-02	2.28E-02	1.33E-03	3.67E-02	1.89E-02	5.51E-03	4.82E-02	1.99E-02
	1.3629	1.3752	1.2496	1.4165	1.4296	1.4825	1.4763	1.4896	1.5374	1.5447	1.5594
	2.34E-01	2.40E-01	1.94E-01	2.59E-01	2.65E-01	2.95E-01	2.91E-01	2.99E-01	3.30E-01	3.35E-01	3.45E-01
	4.27E+04	5.46E+04	(3.58E+01)	4.46E+04	3.29E+04	1.94E+03	4.24E+04	1.86E+04	5.23E+03	3.72E+04	1.27E+04
	4.32E+04	5.43E+04	1.28E+01*	4.50E+04	3.24E+04	2.12E+03*	4.26E+04	1.82E+04	5.53E+03*	3.74E+04	1.23E+04
9	.3555	.3758	.3979	.4222	.4491	.4788	.5119	.5488	.5903	.6373	.6907
	28125.9	26612.0	25130.9	23682.7	22267.5	20885.5	19536.7	18221.4	16939.8	15692.0	14478.2
	2.84E-02	5.22E-03	1.32E-02	2.72E-02	1.32E-04	2.64E-02	2.01E-02	3.16E-03	3.86E-02	1.13E-02	1.40E-02
	1.3524	1.3602	1.3923	1.4037	1.3431	1.4467	1.4591	1.5063	1.5084	1.5188	1.5668
	2.30E-01	2.33E-01	2.47E-01	2.53E-01	2.26E-01	2.74E-01	2.81E-01	3.09E-01	3.10E-01	3.17E-01	3.50E-01
	6.76E+04	1.08E+04	2.59E+04	4.67E+04	(1.51E+02)	3.67E+04	2.40E+04	3.70E+03	3.66E+04	8.87E+03	1.06E+04
	6.77E+04	1.05E+04*	2.64E+04	4.65E+04	1.00E+02*	3.70E+04	2.36E+04	3.94E+03*	3.67E+04	8.53E+03	1.10E+04
10	.3478	.3671	.3882	.4114	.4368	.4648	.4959	.5305	.5692	.6128	.6620
	28753.2	27239.3	25758.2	24310.0	22894.8	21512.8	20164.0	18848.8	17567.1	16319.3	15105.6
	1.79E-02	1.28E-03	2.62E-02	6.06E-03	1.26E-02	2.54E-02	2.14E-05	2.90E-02	1.38E-02	8.88E-03	3.85E-02
	1.3428	1.3818	1.3801	1.3880	1.4217	1.4326	1.6854	1.4774	1.4881	1.5318	1.5412
	2.26E-01	2.42E-01	2.42E-01	2.45E-01	2.61E-01	2.67E-01	4.50E-01	2.92E-01	2.98E-01	3.26E-01	3.32E-01
	4.40E+04	3.02E+03	5.29E+04	1.06E+04	2.09E+04	3.64E+04	(7.20E+01)	3.34E+04	1.35E+04	8.29E+03	2.97E+04
	4.35E+04	3.22E+03*	5.30E+04	1.02E+04*	2.13E+04	3.62E+04	9.46E+01*	3.37E+04	1.31E+04	8.64E+03*	2.96E+04
11	.3407	.3592	.3794	.4014	.4256	.4522	.4816	.5142	.5504	.5910	.6367
	29353.6	27839.8	26358.7	24910.5	23495.3	22113.3	20764.5	19449.2	18167.6	16919.8	15706.0
	3.77E-03	1.29E-02	1.83E-02	9.84E-04	2.51E-02	4.32E-03	1.54E-02	2.12E-02	1.53E-03	3.18E-02	5.41E-03
	1.3297	1.3596	1.3697	1.4146	1.4084	1.4135	1.4511	1.4617	1.5166	1.5086	1.5123
	2.21E-01	2.33E-01	2.37E-01	2.58E-01	2.55E-01	2.57E-01	2.77E-01	2.83E-01	3.16E-01	3.11E-01	3.13E-01
	9.41E+03	3.07E+04	3.81E+04	2.05E+03	4.29E+04	6.26E+03	2.14E+04	2.52E+04	1.85E+03	3.01E+04	4.16E+03
	9.09E+03*	3.11E+04	3.78E+04	2.22E+03*	4.30E+04	5.97E+03*	2.18E+04	2.49E+04	2.02E+03*	3.02E+04	3.91E+03*
12	.3341	.3519	.3713	.3924	.4155	.4408	.4686	.4994	.5336	.5716	.6143
	29927.3	28413.4	26932.3	25484.1	24068.9	22686.9	21338.1	20022.8	18741.2	17493.4	16279.6
	2.99E-04	2.09E-02	4.21E-03	1.24E-02	1.63E-02	2.05E-03	2.46E-02	1.41E-03	2.06E-02	1.38E-02	7.60E-03
	1.3675	1.3500	1.3559	1.3874	1.3969	1.4372	1.4372	1.4295	1.4808	1.4901	1.5333
	2.36E-01	2.29E-01	2.31E-01	2.45E-01	2.49E-01	2.69E-01	2.69E-01	2.65E-01	2.94E-01	2.99E-01	3.27E-01
	(9.07E+02)	5.09E+04	8.91E+03	2.50E+04	2.87E+04	3.51E+03	3.51E+04	(1.61E+03)	2.37E+04	1.34E+04	7.09E+03
	1.01E+03*	5.10E+04	8.59E+03*	2.54E+04	2.84E+04	3.74E+03*	3.51E+04	1.45E+03*	2.40E+04	1.31E+04	7.39E+03*
13	.3281	.3453	.3639	.3842	.4062	.4304	.4569	.4862	.5185	.5543	.5943
	30474.1	28960.2	27479.2	26031.0	24615.8	23233.7	21885.0	20569.7	19288.0	18040.2	16826.5
	6.44E-03	1.72E-02	2.18E-04	1.99E-02	2.83E-03	1.44E-02	1.24E-02	5.26E-03	2.24E-02	4.32E-05	2.58E-02
	1.3332	1.3416	1.4057	1.3770	1.3796	1.4153	1.4241	1.4606	1.4662	1.6704	1.5111
	2.22E-01	2.26E-01	2.53E-01	2.40E-01	2.41E-01	2.58E-01	2.63E-01	2.82E-01	2.85E-01	4.36E-01	3.12E-01
	1.82E+04	4.31E+04	(5.90E+02)	4.11E+04	4.99E+03	2.43E+04	1.81E+04	7.37E+03	2.64E+04	(9.76E+01)	2.42E+04
	1.86E+04*	4.29E+04	6.75E+02*	4.12E+04	4.74E+03*	2.47E+04	1.78E+04	7.67E+03*	2.63E+04	1.27E+02*	2.44E+04
14	.3226	.3392	.3572	.3766	.3978	.4210	.4463	.4742	.5048	.5388	.5765
	30994.3	29480.4	27999.3	26551.1	25135.9	23753.9	22405.1	21089.8	19808.2	18560.4	17346.7
	1.37E-02	7.90E-03	6.19E-03	1.56E-02	7.59E-04	1.95E-02	7.92E-04	1.77E-02	6.67E-03	1.14E-02	1.62E-02
	1.3243	1.3328	1.3605	1.3679	1.4141	1.4044	1.3921	1.4437	1.4496	1.4873	1.4949
	2.19E-01	2.22E-01	2.33E-01	2.36E-01	2.58E-01	2.53E-01	2.47E-01	2.73E-01	2.76E-01	2.97E-01	3.02E-01
	3.97E+04	2.02E+04	1.50E+04	3.30E+04	1.62E+03	3.38E+04	(1.10E+03)	2.50E+04	8.00E+03	1.31E+04	1.56E+04
	4.00E+04	1.99E+04*	1.53E+04*	3.27E+04	1.76E+03*	3.38E+04	9.74E+02*	2.52E+04	7.70E+03*	1.34E+04	1.53E+04
15	.3176	.3336	.3510	.3698	.3902	.4124	.4367	.4633	.4926	.5248	.5605
	31487.8	29974.0	28492.9	27044.7	25629.5	24247.4	22898.7	21583.4	20301.8	19053.9	17840.2
	1.62E-02	1.18E-03	1.32E-02	6.21E-03	7.80E-03	1.26E-02	2.69E-03	1.78E-02	9.03E-05	2.01E-02	1.27E-03
	1.3174	1.3169	1.3508	1.3577	1.3872	1.3943	1.4304	1.4323	1.5544	1.4726	1.4600
	2.16E-01	2.16E-01	2.29E-01	2.32E-01	2.45E-01	2.48E-01	2.66E-01	2.67E-01	3.41E-01	2.89E-01	2.82E-01
	4.80E+04	3.01E+03	3.26E+04	1.34E+04	1.59E+04	2.24E+04	4.62E+03	2.58E+04	(1.78E+02)	2.35E+04	(1.16E+03)
	4.80E+04	2.83E+03*	3.28E+04	1.31E+04*	1.63E+04*	2.21E+04	4.86E+03*	2.57E+04	2.24E+02*	2.36E+04	1.03E+03*

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

v'\v''	0	1	2	3	4	5	6	7	8	9	10
16	.1970	.2045	.2125	.2210	.2301	.2397	.2499	.2608	.2725	.2851	.2985
	50761.4	48888.3	47048.0	45240.5	43465.7	41723.6	40014.0	38337.0	36692.6	35080.7	33501.5
	1.71E-02	2.99E-02	4.97E-03	8.10E-03	1.54E-02	9.05E-05	1.54E-02	2.72E-03	9.60E-03	8.69E-03	3.60E-03
	1.1644	1.1775	1.1882	1.2050	1.2147	1.2684	1.2421	1.2473	1.2714	1.2797	1.3041
	1.72E-01	1.75E-01	1.78E-01	1.82E-01	1.84E-01	2.00E-01	1.92E-01	1.93E-01	2.01E-01	2.03E-01	2.11E-01
	1.34E+05	2.17E+05	3.30E+04	5.02E+04	8.72E+04	5.31E+02	7.35E+04	1.16E+04	3.87E+04	3.14E+04	1.23E+04
	1.35E+05	2.17E+05	3.27E+04*	5.06E+04*	8.69E+04	5.85E+02*	7.36E+04	1.13E+04*	3.90E+04*	3.10E+04*	1.26E+04*
17	.1953	.2027	.2106	.2189	.2278	.2372	.2472	.2579	.2693	.2815	.2946
	51202.0	49328.9	47488.6	45681.1	43906.3	42164.2	40454.6	38777.6	37133.2	35521.3	33942.1
	1.82E-02	2.70E-02	2.29E-03	1.06E-02	1.15E-02	1.37E-03	1.46E-02	3.34E-04	1.23E-02	3.64E-03	7.87E-03
	1.1614	1.1745	1.1847	1.2012	1.2110	1.2346	1.2379	1.2282	1.2662	1.2726	1.2965
	1.72E-01	1.74E-01	1.77E-01	1.81E-01	1.83E-01	1.90E-01	1.91E-01	1.88E-01	1.99E-01	2.01E-01	2.09E-01
	1.46E+05	2.00E+05	1.55E+04	6.69E+04	6.60E+04	7.49E+03	7.09E+04	1.39E+03	5.05E+04	1.33E+04	2.72E+04
	1.46E+05	2.00E+05	1.53E+04*	6.72E+04	6.56E+04	7.68E+03*	7.09E+04	1.29E+03*	5.08E+04	1.30E+04*	2.75E+04*
18	.1937	.2010	.2088	.2169	.2256	.2349	.2447	.2552	.2663	.2783	.2911
	51616.3	49743.2	47902.9	46095.5	44320.7	42578.5	40868.9	39191.9	37547.5	35935.7	34356.4
	1.91E-02	2.40E-02	7.39E-04	1.23E-02	7.71E-03	3.45E-03	1.22E-02	1.44E-04	1.27E-02	7.03E-04	1.08E-02
	1.1585	1.1717	1.1810	1.1979	1.2074	1.2274	1.2340	1.2828	1.2617	1.2593	1.2909
	1.71E-01	1.74E-01	1.76E-01	1.80E-01	1.82E-01	1.88E-01	1.89E-01	2.04E-01	1.98E-01	1.97E-01	2.07E-01
	1.55E+05	1.81E+05	5.09E+03	7.89E+04	4.52E+04	1.90E+04	6.05E+04	7.32E+02	5.33E+04	2.56E+03	3.78E+04
	1.55E+05	1.80E+05	4.95E+03*	7.92E+04	4.48E+04*	1.93E+04*	6.03E+04	7.99E+02*	5.33E+04	2.42E+03*	3.81E+04
19	.1923	.1995	.2071	.2151	.2237	.2327	.2424	.2527	.2636	.2753	.2878
	52004.5	50131.3	48291.1	46483.6	44708.8	42966.6	41257.1	39580.1	37935.6	36323.8	34744.5
	1.96E-02	2.09E-02	7.57E-05	1.31E-02	4.62E-03	5.57E-03	9.15E-03	1.37E-03	1.13E-02	1.94E-05	1.14E-02
	1.1558	1.1692	1.1742	1.1949	1.2039	1.2227	1.2302	1.2554	1.2575	1.3683	1.2861
	1.70E-01	1.73E-01	1.74E-01	1.79E-01	1.81E-01	1.86E-01	1.88E-01	1.96E-01	1.96E-01	2.37E 01	2.05E-01
	1.62E+05	1.60E+05	5.25E+02	8.55E+04	2.76E+04	3.11E+04	4.62E+04	6.59E+03	4.81E+04	(1.05E+02)	4.08E+04
	1.62E+05	1.60E+05	4.82E+02*	8.57E+04	2.73E+04*	3.14E+04*	4.59E+04*	6.78E+03*	4.80E+04	1.30E+02*	4.09E+04
20	.1910	.1980	.2055	.2135	.2219	.2308	.2403	.2504	.2611	.2726	.2848
	52366.5	50493.4	48653.1	46845.6	45070.8	43328.7	41619.1	39942.1	38297.7	36685.8	35106.6
	1.98E-02	1.78E-02	5.45E-05	1.31E-02	2.38E-03	7.24E-03	6.16E-03	3.16E-03	8.81E-03	9.15E-04	1.01E-02
	1.1533	1.1669	1.1846	1.1922	1.2003	1.2191	1.2264	1.2482	1.2534	1.2818	1.2817
	1.70E-01	1.73E-01	1.77E-01	1.79E-01	1.81E-01	1.85E-01	1.87E-01	1.94E-01	1.95E-01	2.04E-01	2.04E-01
	1.66E+05	1.39E+05	3.97E+02	8.68E+04	1.44E+04	4.10E+04	3.16E+04	1.53E+04	3.81E+04	3.81E+03	3.69E+04
	1.66E+05	1.38E+05	4.35E+02*	8.69E+04	1.42E+04*	4.13E+04*	3.13E+04*	1.55E+04*	3.79E+04*	3.96E+03*	3.68E+04
21	.1897	.1967	.2041	.2119	.2202	.2290	.2384	.2483	.2588	.2701	.2822
	52702.0	50828.8	48988.6	47181.1	45406.3	43664.1	41954.6	40277.6	38633.1	37021.3	35442.0
	1.96E-02	1.49E-02	4.39E-04	1.24E-02	9.60E-04	8.21E-03	3.67E-03	4.81E-03	6.09E-03	2.49E-03	7.77E-03
	1.1509	1.1647	1.1777	1.1897	1.1959	1.2160	1.2226	1.2436	1.2495	1.2728	1.2775
	1.69E-01	1.72E-01	1.75E-01	1.78E-01	1.79E-01	1.85E-01	1.86E-01	1.92E-01	1.94E-01	2.01E-01	2.03E-01
	1.67E+05	1.18E+05	3.21E+03	8.34E+04	5.86E+03	4.72E+04	1.90E+04	2.35E+04	2.68E+04	1.04E+04	2.88E+04
	1.67E+05	1.18E+05	3.31E+03*	8.34E+04	5.71E+03*	4.74E+04*	1.88E+04*	2.38E+04*	2.65E+04*	1.06E+04*	2.86E+04*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 17. Radiative transition parameters for O_2^+ $A\ ^2\Pi_u$–$X\ ^2\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^{*} R_e(r) \psi_{v''} dr$. – Continued

v'\v"	11	12	13	14	15	16	17	18	19	20	21
16	.3129	.3285	.3453	.3635	.3832	.4046	.4280	.4535	.4815	.5123	.5462
	31954.9	30441.0	28959.9	27511.7	26096.5	24714.5	23365.7	22050.4	20768.8	19521.0	18307.2
	1.34E-02	3.36E-04	1.51E-02	4.97E-04	1.40E-02	3.47E-03	1.08E-02	8.13E-03	6.86E-03	1.34E-02	3.17E-03
	1.3111	1.3564	1.3435	1.3308	1.3775	1.3809	1.4139	1.4204	1.4542	1.4601	1.5019
	2.14E-01	2.31E-01	2.26E-01	2.21E-01	2.41E-01	2.42E-01	2.57E-01	2.61E-01	2.78E-01	2.82E-01	3.06E-01
	4.06E+04	1.03E+03	3.81E+04	(1.03E+03)	2.91E+04	6.22E+03	1.86E+04	1.20E+04	9.65E+03	1.60E+04	3.70E+03
	4.03E+04	1.13E+03*	3.81E+04	9.16E+02*	2.93E+04	5.97E+03*	1.88E+04	1.17E+04*	9.94E+03*	1.57E+04	3.91E+03*
17	.3087	.3238	.3401	.3578	.3768	.3975	.4201	.4446	.4715	.5010	.5334
	32395.5	30881.6	29400.5	27952.3	26537.1	25155.1	23806.3	22491.0	21209.4	19961.6	18747.9
	8.06E-03	3.65E-03	1.18E-02	9.02E-04	1.40E-02	6.26E-11	1.48E-02	8.03E-04	1.42E-02	2.98E-03	1.27E-02
	1.3047	1.3303	1.3367	1.3741	1.3697	92.5600	1.4044	1.3932	1.4415	1.4421	1.4816
	2.12E-01	2.21E-01	2.24E-01	2.39E-01	2.37E-01	1.20E-01	2.53E-01	2.48E-01	2.72E-01	2.72E-01	2.94E-01
	2.49E+04	1.07E+04	3.03E+04	2.28E+03	2.99E+04	(2.91E-05)	2.58E+04	(1.14E+03)	2.02E+04	3.55E+03	1.46E+04
	2.46F+04*	1.09E+04*	3.01E+04	2.43E+03*	2.98E+04	1.30E+01*	2.59E+04	1.01E+03*	2.04E+04	3.35E+03*	1.48E+04
18	.3048	.3195	.3354	.3525	.3710	.3911	.4129	.4366	.4625	.4908	.5219
	32809.8	31295.9	29814.8	28366.6	26951.5	25569.4	24220.7	22905.4	21623.7	20375.9	19162.2
	3.23E-03	7.76E-03	6.39E-03	4.82E-03	9.43E-03	2.48E-03	1.20E-02	9.35E-04	1.39E-02	1.50E-04	1.54E-02
	1.2972	1.3223	1.3297	1.3564	1.3623	1.3943	1.3961	1.4401	1.4319	1.5236	1.4700
	2.09E-01	2.18E-01	2.21E-01	2.31E-01	2.34E-01	2.48E-01	2.49E-01	2.71E-01	2.67E-01	3.20E-01	2.87E-01
	1.01E+04	2.29E+04	1.67E+04	1.19E+04	2.05E+04	5.18E+03	2.14E+04	1.67E+03	2.03E+04	(2.64E+02)	1.81E+04
	9.84E+03*	2.32E+04*	1.64E+04*	1.22E+04*	2.02E+04*	5.39E+03*	2.12E+04	1.81E+03*	2.02E+04	3.18E+02*	1.81E+04
19	.3012	.3156	.3311	.3478	.3658	.3852	.4064	.4293	.4543	.4816	.5115
	33197.9	31684.1	30203.0	28754.8	27339.6	25957.6	24608.8	23293.5	22011.9	20764.1	19550.3
	5.23E-04	1.03E-02	2.05E-03	8.61E-03	4.06E-03	6.92E-03	6.17E-03	5.44E-03	8.21E-03	4.25E-03	1.01E-02
	1.2818	1.3165	1.3204	1.3486	1.3537	1.3824	1.3872	1.4180	1.4224	1.4563	1.4593
	2.04E-01	2.16E-01	2.17E-01	2.28E-01	2.30E-01	2.43E-01	2.45E-01	2.59E-01	2.62E-01	2.80E-01	2.81E-01
	1.61E+03	3.08E+04	5.42E+03	2.16E+04	8.91E+03	1.44E+04	1.12E+04	9.38E+03	1.22E+04	6.02E+03	1.21E+04
	1.49E+03*	3.10E+04	5.21E+03*	2.18E+04*	8.66E+03*	1.47E+04*	1.09E+04*	9.62E+03*	1.19E+04*	6.24E+03*	1.19E+04
20	.2980	.3121	.3272	.3434	.3610	.3799	.4005	.4227	.4469	.4733	.5022
	33560.0	32046.1	30565.0	29116.8	27701.6	26319.6	24970.8	23655.5	22373.9	21126.1	19912.3
	6.25E-05	1.04E-02	1.22E-04	1.02E-02	7.26E-04	9.76E-03	1.60E-03	9.37E-03	2.52E-03	9.14E-03	3.38E-03
	1.3495	1.3115	1.2850	1.3427	1.3371	1.3751	1.3735	1.4088	1.4093	1.4444	1.4458
	2.29E-01	2.14E-01	2.05E-01	2.26E-01	2.24E-01	2.39E-01	2.39E-01	2.55E-01	2.55E-01	2.73E-01	2.74E-01
	(2.50E+02)	3.19E+04	(2.97E+02)	2.60E+04	1.57E+03	2.07E+04	2.87E+03	1.63E+04	3.73E+03	1.30E+04	4.05E+03
	2.94E+02*	3.19E+04	2.45E+02*	2.61E+04	1.45E+03*	2.08E+04*	2.71E+03*	1.65E+04*	3.55E+03*	1.32E+04*	3.87E+03*
21	.2950	.3088	.3236	.3395	.3567	.3752	.3952	.4168	.4403	.4659	.4939
	33895.4	32381.6	30900.5	29452.3	28037.1	26655.1	25306.3	23991.0	22709.4	21461.6	20247.8
	1.09E-03	8.79E-03	3.48E-04	9.38E-03	4.65E-05	9.81E-03	5.21E-06	1.02E-02	7.20E-05	1.07E-02	1.39E-04
	1.3051	1.3069	1.3458	1.3375	1.4302	1.3691	1.1067	1.4017	1.3335	1.4361	1.3850
	2.12E-01	2.12E-01	2.27E-01	2.24E-01	2.66E-01	2.37E-01	1.61E-01	2.52E-01	2.22E-01	2.69E-01	2.44E-01
	3.86E+03	2.73E+04	1.07E+03	2.44E+04	(1.47E+02)	2.11E+04	(4.42E+00)	1.81E+04	(8.45E+01)	1.55E+04	(1.39E+02)
	4.02E+03*	2.72E+04*	1.16E+03*	2.43E+04*	1.80E+02*	2.11E+04*	4.80E-04*	1.81E+04	5.50E+01*	1.56E+04	9.99E+01*

*The Einstein coefficients for this band may have limited accuracy, since the Franck-Condon factor is less than 0.01 (see text).

Table 18. Radiative transition parameters for O_2^+ $b\ ^4\Sigma_g^- - a\ ^4\Pi_u$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$.

V'\V"	0	1	2	3	4	5	6	7	8	9	10
0	.6000	.6389	.6822	.7308	.7855	.8475	.9183	1.0000	1.0950	1.2067	1.3400
	16666.4	15651.7	14657.4	13683.9	12731.2	11799.6	10889.2	10000.2	9132.6	8286.8	7462.8
	2.65E-01	2.92E-01	2.06E-01	1.19E-01	6.19E-02	3.01E-02	1.41E-02	6.50E-03	2.96E-03	1.34E-03	6.15E-04
	1.3375	1.3013	1.2716	1.2460	1.2235	1.2034	1.1851	1.1684	1.1531	1.1390	1.1260
	2.05E-01	2.19E-01	2.29E-01	2.38E-01	2.45E-01	2.51E-01	2.56E-01	2.61E-01	2.65E-01	2.68E-01	2.71E-01
	2.09E+05	2.17E+05	1.38E+05	6.99E+04	3.10E+04	1.26E+04	4.86E+03	1.79E+03	6.40E+02	2.23E+02	7.62E+01
	2.08E+05	2.16E+05	1.38E+05	7.01E+04	3.12E+04	1.27E+04	4.91E+03	1.81E+03*	6.48E+02*	2.26E+02*	7.73E+01*
1	.5609	.5947	.6321	.6736	.7197	.7715	.8297	.8958	.9713	1.0583	1.1594
	17829.1	16814.4	15820.2	14846.6	13893.9	12962.3	12051.9	11162.9	10295.4	9449.5	8625.5
	4.28E-01	2.34E-02	3.96E-02	1.20E-01	1.33E-01	1.03E-01	6.73E-02	3.96E-02	2.18E-02	1.16E-02	6.04E-03
	1.3791	1.3083	1.3220	1.2819	1.2540	1.2305	1.2099	1.1914	1.1747	1.1594	1.1453
	1.89E-01	2.16E-01	2.11E-01	2.25E-01	2.35E-01	2.43E-01	2.49E-01	2.55E-01	2.59E-01	2.63E-01	2.67E-01
	3.52E+05	2.10E+04	2.83E+04	8.10E+04	7.98E+04	5.37E+04	2.96E+04	1.45E+04	6.49E+03	2.75E+03	1.12E+03
	3.52E+05	2.13E+04	2.78E+04	8.05E+04	7.97E+04	5.38E+04	2.98E+04	1.46E+04	6.55E+03	2.78E+03	1.13E+03*
2	.5275	.5573	.5900	.6260	.6657	.7097	.7587	.8136	.8754	.9454	1.0252
	18957.6	17942.9	16948.6	15975.1	15022.4	14090.8	13180.4	12291.3	11423.8	10578.0	9753.9
	2.44E-01	1.77E-01	1.40E-01	7.27E-03	2.24E-02	7.38E-02	9.29E-02	8.23E-02	6.06E-02	4.00E-02	2.47E-02
	1.4296	1.3980	1.3361	1.2629	1.3022	1.2638	1.2382	1.2168	1.1979	1.1810	1.1657
	1.70E-01	1.82E-01	2.06E-01	2.32E-01	2.18E-01	2.32E-01	2.40E-01	2.47E-01	2.53E-01	2.58E-01	2.62E-01
	1.94E+05	1.37E+05	1.17E+05	6.47E+03	1.47E+04	4.49E+04	4.98E+04	3.78E+04	2.34E+04	1.27E+04	6.35E+03
	1.95E+05	1.37E+05	1.17E+05	6.72E+03*	1.43E+04	4.45E+04	4.96E+04	3.78E+04	2.35E+04	1.28E+04	6.40E+03
3	.4987	.5253	.5542	.5858	.6205	.6585	.7005	.7471	.7988	.8567	.9218
	20051.8	19037.0	18042.8	17069.3	16116.6	15185.0	14274.6	13385.5	12518.0	11672.2	10848.1
	5.81E-02	3.48E-01	2.46E-02	1.42E-01	5.98E-02	8.45E-04	1.95E-02	5.43E-02	6.98E-02	6.56E-02	5.20E-02
	1.4965	1.4425	1.4514	1.3490	1.3018	1.1661	1.2810	1.2475	1.2243	1.2047	1.1875
	1.44E-01	1.65E-01	1.61E-01	2.01E-01	2.18E-01	2.62E-01	2.26E-01	2.37E-01	2.45E-01	2.51E-01	2.56E-01
	3.94E+04	2.64E+05	1.52E+04	1.15E+05	4.84E+04	(8.21E+02)	1.17E+04	2.97E+04	3.32E+04	2.66E+04	1.76E+04
	3.92E+04	2.65E+05	1.51E+04	1.15E+05	4.88E+04	9.43E+02*	1.15E+04	2.94E+04	3.31E+04	2.66E+04	1.76E+04
4	.4737	.4976	.5235	.5516	.5822	.6156	.6521	.6923	.7365	.7854	.8398
	21111.7	20097.0	19102.7	18129.2	17176.5	16244.9	15334.5	14445.4	13577.9	12732.1	11908.0
	4.97E-03	1.43E-01	3.32E-01	2.23E-03	8.20E-02	9.02E-02	2.39E-02	1.56E-04	1.89E-02	4.33E-02	5.46E-02
	1.6041	1.5093	1.4578	1.1443	1.3638	1.3140	1.2705	1.5118	1.2620	1.2331	1.2121
	1.06E-01	1.39E-01	1.59E-01	2.67E-01	1.95E-01	2.14E-01	2.29E-01	1.38E-01	2.32E-01	2.42E-01	2.49E-01
	2.12E+03	9.12E+04	2.36E+05	3.84E+03	6.41E+04	7.17E+04	1.84E+04	(3.65E+01)	1.03E+04	2.12E+04	2.31E+04
	1.98E+03*	9.10E+04	2.38E+05	4.20E+03*	6.34E+04	7.17E+04	1.87E+04	2.39E+01*	1.01E+04	2.10E+04	2.30E+04
5	.4517	.4734	.4968	.5221	.5494	.5790	.6112	.6464	.6848	.7269	.7732
	22137.3	21122.5	20128.3	19154.8	18202.1	17270.5	16360.1	15471.0	14603.5	13757.7	12933.6
	5.90E-05	1.60E-02	2.26E-01	2.66E-01	3.29E-02	2.89E-02	8.31E-02	5.01E-02	7.92E-03	1.68E-03	1.81E-02
	1.9562	1.6230	1.5229	1.4767	1.3295	1.3881	1.3244	1.2848	1.2371	1.3160	1.2459
	2.60E-02	9.97E-02	1.34E-01	1.52E-01	2.08E-01	1.86E-01	2.10E-01	2.24E-01	2.41E-01	2.13E-01	2.38E-01
	1.75E+00	6.06E+03	1.35E+05	1.74E+05	3.48E+04	2.08E+04	6.50E+04	3.78E+04	5.79E+03	8.04E+02	8.99E+03
	1.81E+00*	5.61E+03	1.35E+05	1.76E+05	3.46E+04	2.04E+04	6.47E+04	3.81E+04	6.02E+03*	7.35E+02*	8.79E+03
6	.4324	.4522	.4735	.4964	.5210	.5476	.5763	.6075	.6412	.6780	.7181
	23128.5	22113.8	21119.5	20146.0	19193.3	18261.7	17351.3	16462.2	15594.7	14748.9	13924.8
	3.10E-06	1.51E-04	3.11E-02	2.96E-01	1.95E-01	6.62E-02	3.64E-03	5.72E-02	6.11E-02	2.50E-02	1.82E-03
	1.2975	2.0951	1.6435	1.5375	1.5013	1.3538	1.4702	1.3356	1.2942	1.2586	1.1874
	2.20E-01	1.27E-02	9.32E-02	1.29E-01	1.42E-01	1.99E-01	1.54E-01	2.06E-01	2.21E-01	2.34E-01	2.56E-01
	(7.52E+00)(	1.06E+00)	1.03E+04	1.63E+05	1.13E+05	6.47E+04	1.83E+03	4.38E+04	4.59E+04	1.77E+04	1.30E+03
	6.00E+00*	3.57E+01*	9.42E+03	1.64E+05	1.16E+05	6.38E+04	1.69E+03*	4.33E+04	4.59E+04	1.80E+04	1.42E+03*
7	.4152	.4335	.4530	.4739	.4963	.5203	.5462	.5741	.6042	.6367	.6720
	24085.2	23070.5	22076.3	21102.7	20150.1	19218.4	18308.0	17419.0	16551.5	15705.6	14881.6
	1.14E-07	2.33E-05	1.77E-04	4.75E-02	3.50E-01	1.39E-01	8.47E-02	8.91E-04	3.05E-02	5.66E-02	3.85E-02
	2.0022	1.4032	2.3657	1.6660	1.5532	1.5337	1.3633	1.1262	1.3502	1.3026	1.2689
	2.07E-02	1.80E-01	2.38E-03	8.64E-02	1.23E-01	1.30E-01	1.9[illegible]-01	2.71E-01	2.00E-01	2.18E-01	2.30E-01
	(2.76E-03)(	3.75E+01)(	4.38E-02)(	1.35E+04)	1.77E+05	6.79E+04	8.04E+04	(1.40E+03)	2.25E+04	4.23E+04	2.72E+04
	3.50E-02*	2.89E+01*	2.08E+02*	1.21E+04	1.79E+05	7.03E+04	7.87E+04	1.70E+03*	2.20E+04	4.20E+04	2.74E+04

Table 18. Radiative transition parameters for O_2^+ $b\ ^4\Sigma_g^- - a\ ^4\Pi_u$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
0	1.5014	1.7005	1.9521	2.2793	2.7216	3.3511	4.3164	5.9790	9.5088	22.0063	-84.2112
	6660.7	5880.6	5122.8	4387.3	3674.4	2984.1	2316.7	1672.5	1051.7	454.4	-118.7
	2.84E-04	1.34E-04	6.42E-05	3.16E-05	1.61E-05	8.47E-06	4.64E-06	2.65E-06	1.58E-06	9.85E-07	6.40E-07
	1.1141	1.1031	1.0933	1.0845	1.0769	1.0705	1.0654	1.0616	1.0590	1.0575	1.0570
	2.74E-01	2.76E-01	2.78E-01	2.79E-01	2.81E-01	2.82E-01	2.82E-01	2.83E-01	2.83E-01	2.83E-01	2.83E-01
	2.55E+01	8.38E+00	2.70E+00	8.44E-01	2.54E-01	7.23E-02	1.86E-02	4.02E-03	5.97E-04	3.01E-05	-1.74E-07
	2.59E+01*	8.53E+00*	2.75E+00*	8.60E-01*	2.59E-01*	7.36E-02*	1.90E-02*	4.08E-03*	6.06E-04*	3.05E-05*	-1.76E-07*
1	1.2782	1.4198	1.5910	1.8018	2.0674	2.4115	2.8740	3.5270	4.5159	6.1838	9.5788
	7823.4	7043.3	6285.5	5550.0	4837.1	4146.8	3479.5	2835.2	2214.4	1617.1	1044.0
	3.11E-03	1.60E-03	8.27E-04	4.34E-04	2.32E-04	1.27E-04	7.17E-05	4.18E-05	2.52E-05	1.58E-05	1.02E-05
	1.1324	1.1206	1.1098	1.1001	1.0915	1.0839	1.0776	1.0723	1.0683	1.0653	1.0633
	2.70E-01	2.72E-01	2.75E-01	2.76E-01	2.78E-01	2.79E-01	2.80E-01	2.81E-01	2.82E-01	2.82E-01	2.83E-01
	4.39E+02	1.68E+02	6.27E+01	2.30E+01	8.22E+00	2.87E+00	9.62E-01	3.05E-01	8.81E-02	2.16E-02	3.77E-03
	4.45E+02*	1.70E+02*	6.37E+01*	2.34E+01*	8.37E+00*	2.92E+00*	9.79E-01*	3.10E-01*	8.96E-02*	2.19E-02*	3.82E-03*
2	1.1171	1.2237	1.3488	1.4973	1.6763	1.8956	2.1702	2.5229	2.9915	3.6422	4.6031
	8951.8	8171.8	7414.0	6678.5	5965.5	5275.3	4607.9	3963.7	3342.8	2745.6	2172.4
	1.46E-02	8.38E-03	4.76E-03	2.70E-03	1.54E-03	8.89E-04	5.23E-04	3.14E-04	1.94E-04	1.23E-04	8.08E-05
	1.1517	1.1388	1.1272	1.1165	1.1070	1.0985	1.0910	1.0846	1.0793	1.0750	1.0717
	2.65E-01	2.68E-01	2.71E-01	2.73E-01	2.75E-01	2.77E-01	2.78E-01	2.79E-01	2.80E-01	2.81E-01	2.81E-01
	2.98E+03	1.33E+03	5.78E+02	2.43E+02	1.00E+02	4.05E+01	1.60E+01	6.19E+00	2.31E+00	8.16E-01	2.66E-01
	3.01E+03	1.35E+03*	5.85E+02*	2.47E+02*	1.02E+02*	4.12E+01*	1.63E+01*	6.28E+00*	2.34E+00*	8.28E-01*	2.69E-01*
3	.9954	1.0792	1.1753	1.2866	1.4165	1.5700	1.7537	1.9771	2.2538	2.6043	3.0613
	10046.0	9266.0	8508.2	7772.7	7059.7	6369.5	5702.1	5057.9	4437.0	3839.8	3266.6
	3.71E-02	2.48E-02	1.59E-02	9.97E-03	6.17E-03	3.80E-03	2.36E-03	1.48E-03	9.47E-04	6.17E-04	4.11E-04
	1.1721	1.1581	1.1454	1.1338	1.1233	1.1139	1.1055	1.0982	1.0918	1.0864	1.0819
	2.60E-01	2.64E-01	2.67E-01	2.69E-01	2.72E-01	2.74E-01	2.75E-01	2.77E-01	2.78E-01	2.79E-01	2.80E-01
	1.03E+04	5.56E+03	2.83E+03	1.38E+03	6.49E+02	2.99E+02	1.35E+02	5.96E+01	2.59E+01	1.10E+01	4.55E+00
	1.04E+04	5.61E+03	2.86E+03	1.39E+03*	6.57E+02*	3.03E+02*	1.36E+02*	6.04E+01*	2.63E+01*	1.12E+01*	4.61E+00*
4	.9004	.9684	1.0451	1.1322	1.2316	1.3460	1.4788	1.6346	1.8192	2.0409	2.3113
	11105.9	10325.9	9568.1	8832.6	8119.6	7429.4	6762.0	6117.8	5496.9	4899.7	4326.5
	5.29E-02	4.40E-02	3.33E-02	2.37E-02	1.63E-02	1.10E-02	7.30E-03	4.85E-03	3.24E-03	2.19E-03	1.50E-03
	1.1944	1.1788	1.1647	1.1521	1.1406	1.1303	1.1210	1.1127	1.1054	1.0990	1.0936
	2.54E-01	2.58E-01	2.62E-01	2.65E-01	2.68E-01	2.70E-01	2.72E-01	2.74E-01	2.75E-01	2.77E-01	2.78E-01
	1.89E+04	1.31E+04	8.11E+03	4.66E+03	2.54E+03	1.33E+03	6.78E+02	3.38E+02	1.66E+02	7.99E+01	3.80E+01
	1.89E+04	1.31E+04	8.15E+03	4.70E+03	2.56E+03	1.34E+03	6.86E+02*	3.42E+02*	1.68E+02*	8.10E+01*	3.85E+01*
5	.8243	.8809	.9440	1.0144	1.0935	1.1827	1.2841	1.3999	1.5331	1.6877	1.8684
	12131.5	11351.5	10593.7	9858.2	9145.2	8455.0	7787.6	7143.4	6522.5	5925.3	5352.1
	3.53E-02	4.35E-02	4.27E-02	3.68E-02	2.92E-02	2.20E-02	1.61E-02	1.15E-02	8.16E-03	5.79E-03	4.13E-03
	1.2209	1.2019	1.1859	1.1717	1.1590	1.1476	1.1374	1.1282	1.1200	1.1127	1.1064
	2.46E-01	2.52E-01	2.56E-01	2.60E-01	2.63E-01	2.66E-01	2.69E-01	2.71E-01	2.73E-01	2.74E-01	2.75E-01
	1.54E+04	1.63E+04	1.35E+04	9.67E+03	6.29E+03	3.82E+03	2.22E+03	1.24E+03	6.82E+02	3.67E+02	1.94E+02
	1.53E+04	1.62E+04	1.35E+04	9.69E+03	6.32E+03	3.85E+03	2.24E+03	1.26E+03	6.89E+02*	3.71E+02*	1.97E+02*
6	.7620	.8102	.8632	.9217	.9865	1.0586	1.1391	1.2293	1.3309	1.4458	1.5765
	13122.7	12342.7	11584.9	10849.4	10136.4	9446.2	8778.8	8134.6	7513.7	6916.5	6343.3
	3.39E-03	1.67E-02	2.87E-02	3.45E-02	3.43E-02	3.05E-02	2.53E-02	2.00E-02	1.54E-02	1.16E-02	8.74E-03
	1.2776	1.2330	1.2108	1.1937	1.1791	1.1663	1.1549	1.1447	1.1356	1.1274	1.1202
	2.27E-01	2.42E-01	2.49E-01	2.54E-01	2.58E-01	2.62E-01	2.64E-01	2.67E-01	2.69E-01	2.71E-01	2.72E-01
	1.60E+03	7.43E+03	1.12E+04	1.15E+04	9.65E+03	7.13E+03	4.84E+03	3.11E+03	1.91E+03	1.14E+03	6.71E+02
	1.51E+03*	7.28E+03	1.11E+04	1.15E+04	9.64E+03	7.14E+03	4.86E+03	3.13E+03	1.93E+03	1.15E+03	6.77E+02*
7	.7103	.7519	.7973	.8470	.9015	.9613	1.0272	1.0999	1.1806	1.2701	1.3698
	14079.5	13299.4	12541.6	11806.1	11093.2	10402.9	9735.6	9091.4	8470.5	7873.2	7300.1
	1.14E-02	1.41E-04	4.37E-03	1.44E-02	2.29E-02	2.70E-02	2.73E-02	2.49E-02	2.15E-02	1.77E-02	1.43E-02
	1.2327	1.0127	1.2579	1.2230	1.2031	1.1875	1.1743	1.1627	1.1524	1.1433	1.1352
	2.42E-01	2.88E-01	2.34E-01	2.45E-01	2.51E-01	2.56E-01	2.59E-01	2.62E-01	2.65E-01	2.67E-01	2.69E-01
	7.55E+03	(1.11E+02)	1.91E+03	5.77E+03	7.98E+03	8.06E+03	6.86E+03	5.23E+03	3.71E+03	2.51E+03	1.63E+03
	7.76E+03	1.63E+02*	1.82E+03*	5.65E+03	7.89E+03	8.02E+03	6.85E+03	5.24E+03	3.73E+03	2.52E+03	1.64E+03

Table 18. Radiative transition parameters for O_2^+ $b\ ^4\Sigma_g^- - a\ ^4\Pi_u$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. - Continued

v'\v"	0	1	2	3	4	5	6	7	8	9	10
8	.3999	.4168	.4348	.4540	.4746	.4965	.5200	.5452	.5723	.6014	.6328
	25007.4	23992.7	22998.4	22024.9	21072.2	20140.6	19230.2	18341.1	17473.6	16627.8	15803.8
	1.48E-08	3.28E-07	9.09E-05	8.15E-05	6.23E-02	3.93E-01	1.00E-01	8.77E-02	9.55E-03	1.18E-02	4.36E-02
	1.3868	2.3385	1.4872	3.2179	1.6910	1.5700	1.5761	1.3659	1.2967	1.3750	1.3110
	1.86E-01	2.86E-03	1.48E-01	1.21E-06	7.92E-02	1.17E-01	1.15E-01	1.94E-01	2.20E-01	1.91E-01	2.15E-01
	(3.24E-02)(	1.50E-04)(	9.76E+01)(	5.15E-09)(	1.48E+04)	1.80E+05	3.84E+04	8.28E+04	1.00E+04	8.01E+03	3.22E+04
	2.37E-02*	7.34E-01*	7.32E+01*	7.13E+02*	1.29E+04	1.83E+05	4.06E+04	8.03E+04	1.04E+04*	7.73E+03	3.18E+04
9	.3862	.4019	.4187	.4364	.4554	.4756	.4971	.5201	.5446	.5709	.5991
	25894.9	24880.1	23885.9	22912.3	21959.7	21028.0	20117.6	19228.6	18361.1	17515.2	16691.2
	3.89E-12	1.43E-07	1.88E-07	2.45E-04	3.07E-06	7.29E-02	4.30E-01	7.67E-02	7.99E-02	2.11E-02	2.36E-03
	8.5735	1.5064	3.7136	1.5616	-9.1323	1.7196	1.5880	1.6291	1.3618	1.3283	1.4441
	0.00E+00	1.40E-01	2.89E-09	1.20E-01	0.00E+00	7.14E-02	1.11E-01	9.77E-02	1.96E-01	2.09E-01	1.64E-01
	(0.00E+00)(	1.76E-01)(	8.65E-17)(	1.73E+02)(	0.00E+00)(	1.40E+04)	1.75E+05	2.11E+04	7.69E+04	2.00E+04	1.20E+03
	2.21E-03*	1.11E-01*	5.32E+00*	1.23E+02*	1.79E+03*	1.17E+04	1.81E+05	2.29E+04	7.35E+04	2.05E+04	1.10E+03*
10	.3739	.3886	.4042	.4208	.4384	.4570	.4769	.4980	.5205	.5444	.5700
	26747.4	25732.7	24738.5	23764.9	22812.2	21880.6	20970.2	20081.2	19213.7	18367.8	17543.8
	9.18E-11	9.03E-10	6.60E-07	2.92E-07	5.07E-04	3.92E-04	7.75E-02	4.63E-01	6.49E-02	6.65E-02	3.10E-02
	1.6990	.1548	1.6192	-1.3590	1.6343	.4800	1.7533	1.6070	1.6894	1.3483	1.3464
	7.69E-02	6.00E-02	1.01E-01	6.12E-07	9.61E-02	1.66E-01	6.28E-02	1.05E-01	7.96E-02	2.01E-01	2.02E-01
	(4.21E-05)(	2.24E-04)(	4.12E-01)(	5.95E-12)(	2.25E+02)(	4.57E+02)(	1.14E+04)	1.67E+05	1.18E+04	6.74E+04	2.76E+04
	3.00E-06*	2.78E-02*	1.84E-01*	2.24E+01*	1.41E+02*	3.63E+03*	8.82E+03	1.75E+05	1.29E+04	6.31E+04	2.83E+04
11	.3628	.3766	.3913	.4068	.4232	.4406	.4590	.4785	.4992	.5212	.5446
	27565.0	26550.2	25556.0	24582.4	23629.8	22698.1	21787.7	20898.7	20031.2	19185.3	18361.3
	7.76E-12	6.41E-10	2.24E-08	1.86E-06	8.23E-06	8.36E-04	2.05E-03	7.46E-02	4.93E-01	6.25E-02	5.09E-02
	1.2261	1.9175	.9925	1.7465	.7787	1.7134	1.0710	1.7947	1.6269	1.7496	1.3189
	2.44E-01	3.13E-02	2.89E-01	6.45E-02	2.68E-01	7.30E-02	2.81E-01	5.33E-02	9.84E-02	6.37E-02	2.12E-01
	(3.92E-05)(	4.75E-05)(	1.27E-01)(	4.67E-01)(	3.16E+01)(	2.11E+02)	6.82E+03 (	7.85E+03)	1.56E+05	7.26E+03 (	5.74E+04)
	3.37E-05*	2.54E-04*	1.55E-01*	3.84E-02*	6.59E+01*	9.56E+01*	6.26E+03*	5.16E+03	1.66E+05	7.69E+03	5.19E+04
12	.3528	.3659	.3797	.3942	.4096	.4259	.4431	.4612	.4805	.5008	.5224
	28347.3	27332.5	26338.3	25364.7	24412.1	23480.4	22570.0	21681.0	20813.5	19967.6	19143.6
	8.75E-15	1.41E-10	1.38E-09	1.86E-07	3.35E-06	4.91E-05	1.10E-03	6.04E-03	6.38E-02	5.21E-01	6.83E-02
	-3.7600	1.4233	2.3996	1.2767	1.9274	1.1775	1.8115	1.2987	1.8493	1.6476	1.8019
	8.94E-25	1.72E-01	1.88E-03	2.27E-01	2.98E-02	2.59E-01	4.98E-02	2.19E-01	4.24E-02	9.19E-02	5.18E-02
	(0.00E+00)(	3.45E-04)(	3.64E-07)(	6.35E-01)(	1.76E-01)(	1.72E+02)(	1.27E+02)(	1.20E+04)(	4.20E+03)	1.42E+05	5.21E+03
	5.09E-06*	2.22E-04*	7.75E-03*	5.03E-01*	4.96E-01*	1.46E+02*	1.34E+01*	9.44E+03*	1.80E+03	1.55E+05	5.12E+03
13	.3437	.3561	.3692	.3830	.3975	.4128	.4289	.4459	.4638	.4828	.5028
	29094.1	28079.4	27085.1	26111.6	25158.9	24227.3	23316.9	22427.9	21560.3	20714.5	19890.5
	7.80E-14	4.36E-12	1.03E-09	9.08E-11	8.78E-07	3.27E-06	1.73E-04	1.08E-03	1.33E-02	4.61E-02	5.43E-01
	1.9524	.6856	1.5946	9.5421	1.4485	2.3031	1.3678	1.9584	1.4287	1.9303	1.6688
	2.65E-02	2.42E-01	1.09E-01	0.00E+00	1.62E-01	3.62E-03	1.94E-01	2.57E-02	1.70E-01	2.94E-02	8.55E-02
	(5.46E-09)(	2.28E-05)(	9.88E-04)(	0.00E+00)(	1.49E+00)(	2.47E-03)(	3.33E+02)(	3.27E+01)(	1.56E+04)(	1.44E+03)(	1.27E+05)
	9.11E-08*	8.71E-05*	3.33E-04*	7.05E-02*	1.00E+00*	6.92E+00*	2.52E+02*	5.23E+01*	1.25E+04	4.32E+01	1.42E+05
14	.3355	.3473	.3598	.3728	.3865	.4010	.4162	.4322	.4490	.4667	.4854
	29805.4	28790.6	27796.4	26822.8	25870.2	24938.6	24028.1	23139.1	22271.6	21425.8	20601.7
	2.40E-14	2.56E-13	9.92E-11	3.85E-09	1.62E-08	2.75E-06	4.71E-07	4.40E-04	6.58E-04	2.42E-02	2.49E-02
	1.4872	2.8883	1.1640	1.8020	.4353	1.5906	4.7919	1.4960	2.2675	1.5198	2.0793
	1.48E-01	3.45E-05	2.62E-01	5.18E-02	1.49E-01	1.10E-01	9.26E-17	1.44E-01	4.55E-03	1.35E-01	1.38E-02
	(5.61E-08)(	2.95E-14)	5.93E-04 (	8.07E-04)(	2.51E-02)(	2.11E+00)(	2.27E-31)(	4.60E+02)(	6.11E-01)(	1.77E+04)(	1.69E+02)
	3.24E-08*	7.35E-06*	5.55E-04*	1.99E-04*	3.48E-01*	1.02E+00*	3.38E+01*	3.31E+02*	5.35E+02*	1.47E+04	1.18E+03
15	.3281	.3394	.3512	.3637	.3767	.3904	.4048	.4199	.4358	.4525	.4700
	30480.8	29466.1	28471.8	27498.3	26545.6	25614.0	24703.6	23814.5	22947.0	22101.2	21277.1
	1.92E-15	3.53E-13	2.17E-13	8.91E-10	6.56E-09	2.23E-07	5.90E-06	5.13E-06	8.63E-04	8.07E-05	3.73E-02
	1.0276	1.7013	-3.2691	1.4086	2.2017	1.1167	1.7443	.1876	1.6040	4.0614	1.5933
	2.87E-01	7.63E-02	3.87E-20	1.78E-01	6.84E-03	2.73E-01	6.50E-02	6.80E-02	1.06E-01	2.05E-11	1.09E-01
	(1.81E-08)(	2.13E-07)(	3.08E-44)(	2.37E-03)(	2.33E-05)	1.13E+00 (	1.52E+00)(	1.30E+00)(	4.73E+02)(	1.48E-18)(	1.74E+04)
	2.49E-08*	6.58E-10*	1.07E-04*	1.55E-03*	1.89E-02*	1.09E+00*	1.14E-01*	1.04E+02*	3.04E+02*	1.88E+03*	1.49E+04

Table 18. Radiative transition parameters for O_2^+ $b\ ^4\Sigma_g^- - a\ ^4\Pi_u$. For each $v'-v''$ band, the listed quantities are $\lambda_{v'v''}$ (μm), $\nu_{v'v''}$ (cm^{-1}), $q_{v'v''}$, $\bar{r}_{v'v''}$ (Å), $R_e(\bar{r}_{v'v''})$ (electric dipole moment atomic units), $A_{v'v''}$ (s^{-1}) calculated by the r-centroid method, and $A_{v'v''}$ (s^{-1}) calculated by integrating $\int \psi_{v'}^* R_e(r) \psi_{v''} dr$. – Continued

V'\V"	11	12	13	14	15	16	17	18	19	20	21
8	.6666	.7032	.7427	.7857	.8323	.8830	.9383	.9987	1.0647	1.1370	1.2162
	15001.7	14221.6	13463.8	12728.3	12015.3	11325.1	10657.7	10013.5	9392.7	8795.4	8222.2
	4.37E-02	2.24E-02	4.86E-03	3.88E-05	4.41E-03	1.16E-02	1.75E-02	2.06E-02	2.12E-02	2.00E-02	1.78E-02
	1.2767	1.2461	1.2046	1.6442	1.2463	1.2160	1.1977	1.1833	1.1712	1.1607	1.1515
	2.27E-01	2.38E-01	2.51E-01	9.30E-02	2.38E-01	2.47E-01	2.53E-01	2.57E-01	2.60E-01	2.63E-01	2.65E-01
	3.09E+04	1.48E+04	3.02E+03	(2.80E+00)	1.75E+03	4.19E+03	5.49E+03	5.54E+03	4.82E+03	3.80E+03	2.82E+03
	3.09E+04	1.50E+04	3.16E+03*	8.01E-01*	1.68E+03*	4.11E+03	5.44E+03	5.51E+03	4.80E+03	3.81E+03	2.83E+03
9	.6294	.6619	.6968	.7344	.7750	.8188	.8662	.9174	.9728	1.0328	1.0977
	15889.1	15109.1	14351.2	13615.7	12902.8	12212.5	11545.2	10901.0	10280.1	9682.9	9109.7
	2.86E-02	4.10E-02	3.00E-02	1.27E-02	2.08E-03	2.05E-04	3.71E-03	8.71E-03	1.28E-02	1.52E-02	1.59E-02
	1.3205	1.2837	1.2545	1.2247	1.1718	1.3953	1.2405	1.2120	1.1946	1.1812	1.1701
	2.11E-01	2.25E-01	2.35E-01	2.45E-01	2.60E-01	1.83E-01	2.40E-01	2.49E-01	2.54E-01	2.57E-01	2.61E-01
	2.08E+04	2.90E+04	1.98E+04	7.80E+03	1.23E+03	(5.06E+01)	1.33E+03	2.82E+03	3.63E+03	3.71E+03	3.31E+03
	2.04E+04	2.88E+04	2.00E+04	7.97E+03	1.31E+03*	4.22E+01*	1.28E+03*	2.77E+03*	3.59E+03	3.68E+03	3.30E+03
10	.5973	.6265	.6577	.6912	.7270	.7654	.8066	.8508	.8983	.9492	1.0038
	16741.7	15961.6	15203.8	14468.3	13755.4	13065.1	12397.8	11753.5	11132.7	10535.4	9962.3
	4.82E-06	1.59E-02	3.36E-02	3.25E-02	1.99E-02	7.51E-03	1.03E-03	2.22E-04	2.63E-03	5.95E-03	8.78E-03
	-1.2754	1.3326	1.2905	1.2614	1.2349	1.2044	1.1366	1.3784	1.2407	1.2115	1.1942
	1.54E-06	2.07E-01	2.22E-01	2.33E-01	2.41E-01	2.51E-01	2.69E-01	1.90E-01	2.39E-01	2.49E-01	2.54E-01
	(2.19E-10)	1.12E+04	2.37E+04	2.16E+04	1.22E+04	4.27E+03	5.74E+02	(5.26E+01)	8.44E+02	1.74E+03	2.27E+03
	1.65E+02*	1.09E+04	2.34E+04	2.16E+04	1.23E+04	4.40E+03*	6.33E+02*	4.57E+01*	8.11E+02*	1.71E+03*	2.24E+03*
11	.5695	.5960	.6242	.6542	.6862	.7203	.7567	.7955	.8368	.8808	.9277
	17559.2	16779.2	16021.3	15285.8	14572.9	13882.6	13215.3	12571.1	11950.2	11353.0	10779.8
	3.80E-02	1.82E-03	7.00E-03	2.44E-02	3.05E-02	2.41E-02	1.34E-02	4.90E-03	7.03E-04	1.06E-04	1.52E-03
	1.3625	1.1963	1.3511	1.2977	1.2675	1.2424	1.2176	1.1865	1.1114	1.4459	1.2495
	1.96E-01	2.53E-01	2.00E-01	2.20E-01	2.30E-01	2.39E-01	2.47E-01	2.56E-01	2.74E-01	1.63E-01	2.37E-01
	3.19E+04	2.23E+03	4.66E+03	1.71E+04	2.03E+04	1.49E+04	7.63E+03	2.58E+03	(3.66E+02)(	1.68E+01)	4.33E+02
	3.29E+04	2.43E+03*	4.43E+03*	1.67E+04	2.02E+04	1.50E+04	7.75E+03	2.68E+03*	4.11E+02*	1.44E+01*	4.14E+02*
12	.5452	.5694	.5951	.6223	.6512	.6819	.7144	.7489	.7854	.8240	.8649
	18341.5	17561.5	16803.6	16068.1	15355.2	14664.9	13997.6	13353.4	12732.5	12135.3	11562.1
	3.53E-02	4.21E-02	5.34E-03	2.02E-03	1.57E-02	2.54E-02	2.48E-02	1.77E-02	9.60E-03	3.70E-03	7.05E-04
	1.2598	1.3809	1.2508	1.3904	1.3063	1.2736	1.2489	1.2264	1.2031	1.1729	1.1068
	2.33E-01	1.89E-01	2.36E-01	1.85E-01	2.17E-01	2.28E-01	2.37E-01	2.44E-01	2.51E-01	2.60E-01	2.75E-01
	(4.80E+04)	3.29E+04	5.73E+03	(1.16E+03)	1.08E+04	1.70E+04	1.55E+04	1.02E+04	5.07E+03	1.81E+03	(3.35E+02)
	4.16E+04	3.44E+04	5.89E+03*	1.04E+03*	1.05E+04	1.67E+04	1.54E+04	1.02E+04	5.16E+03*	1.88E+03*	3.72E+02*
13	.5239	.5462	.5698	.5947	.6210	.6489	.6782	.7092	.7419	.7763	.8124
	19088.4	18308.3	17550.5	16815.0	16102.1	15411.8	14744.5	14100.2	13479.4	12882.1	12309.0
	8.27E-02	2.12E-02	4.46E-02	8.92E-03	1.19E-04	8.71E-03	1.91E-02	2.26E-02	1.95E-02	1.34E-02	7.47E-03
	1.8421	1.1365	1.4053	1.2631	1.6226	1.3179	1.2800	1.2550	1.2336	1.2133	1.1919
	4.38E-02	2.69E-01	1.79E-01	2.32E-01	9.98E-02	2.12E-01	2.26E-01	2.35E-01	2.42E-01	2.48E-01	2.54E-01
	(4.47E+03)(	3.81E+04)	3.13E+04	9.25E+03	(2.01E+01)	5.83E+03	1.27E+04	1.41E+04	1.13E+04	7.13E+03	3.65E+03
	4.00E+03	3.28E+04	3.38E+04	9.27E+03*	6.25E+00*	5.61E+03*	1.24E+04	1.40E+04	1.13E+04	7.20E+03	3.73E+03*
14	.5051	.5258	.5476	.5706	.5948	.6202	.6470	.6752	.7047	.7357	.7680
	19799.6	19019.6	18261.7	17526.3	16813.3	16123.0	15455.7	14811.5	14190.6	13593.4	13020.2
	5.52E-01	1.07E-01	9.58E-03	4.65E-02	1.16E-02	3.22E-04	3.92E-03	1.28E-02	1.85E-02	1.87E-02	1.53E-02
	1.6903	1.8713	.8343	1.4393	1.2582	1.1518	1.3374	1.2874	1.2611	1.2401	1.2214
	7.94E-02	3.85E-02	2.79E-01	1.66E-01	2.34E-01	2.65E-01	2.05E-01	2.23E-01	2.33E-01	2.40E-01	2.46E-01
	(1.09E+05)(	4.42E+03)(	1.84E+04)(	2.79E+04)	1.22E+04	(3.84E+02)	2.47E+03	8.43E+03	1.16E+04	1.09E+04	8.24E+03
	1.27E+05	3.71E+03	2.55E+04*	3.18E+04	1.19E+04	5.01E+02*	2.32E+03*	8.21E+03	1.14E+04	1.09E+04	8.26E+03
15	.4884	.5077	.5281	.5494	.5718	.5953	.6199	.6457	.6727	.7008	.7302
	20475.0	19695.0	18937.2	18201.7	17488.7	16798.5	16131.1	15486.9	14866.0	14268.8	13695.6
	6.60E-03	5.41E-01	1.41E-01	1.91E-03	4.92E-02	1.29E-02	1.75E-03	1.18E-03	7.56E-03	1.36E-02	1.61E-02
	2.5309	1.7117	1.8928	-.3950	1.4865	1.2360	1.2673	1.3839	1.2968	1.2678	1.2465
	7.21E-04	7.35E-02	3.50E-02	3.35E-03	1.48E-01	2.41E-01	2.31E-01	1.87E-01	2.20E-01	2.30E-01	2.38E-01
	(1.19E-01)(	9.03E+04)(	4.74E+03)(	5.22E-01)(	2.33E+04)	1.44E+04	(1.58E+03)(	6.22E+02)	4.88E+03	8.50E+03	9.43E+03
	6.14E+03*	1.09E+05	3.93E+03	1.97E+04*	2.91E+04	1.37E+04	1.80E+03*	5.61E+02*	4.69E+03*	8.33E+03	9.33E+03

Table 19. Calculated radiative lifetimes (s) of N_2, N_2^+, and O_2^+ states as a function of vibrational level.

v	$N_2\ A\ ^3\Sigma_u^+$	$N_2\ B\ ^3\Pi_g$	$N_2\ W\ ^3\Delta_u$	$N_2\ B'\ ^3\Sigma_u^-$	$N_2\ a\ ^1\Pi_g$	$N_2\ w\ ^1\Delta_u$	$N_2\ C\ ^3\Pi_u$
0	2.05	1.13(-5)*	>1†	4.54(-5)	5.77(-5)	7.67(-4)	3.71(-8)
1	2.09	9.26(-6)	4.53(-3)	3.57(-5)	5.68(-5)	4.08(-4)	3.75(-8)
2	2.12	7.87(-6)	1.22(-3)	2.98(-5)	5.58(-5)	2.79(-4)	3.81(-8)
3	2.14	6.90(-6)	6.04(-4)	2.58(-5)	5.50(-5)	2.13(-4)	3.90(-8)
4	2.14	6.17(-6)	3.78(-4)	2.29(-5)	5.42(-5)	1.72(-4)	4.04(-8)
5	2.14	5.62(-6)	2.66(-4)	2.07(-5)	5.36(-5)	1.45(-4)	
6	2.16	5.19(-6)	2.02(-4)	1.90(-5)	5.32(-5)	1.26(-4)	
7	2.36	4.85(-6)	1.61(-4)	1.76(-5)	5.29(-5)§	1.11(-4)	
8	1.99	4.58(-6)	1.34(-4)	1.65(-5)	5.28(-5)§	1.00(-4)	
9	1.07	4.36(-6)	1.14(-4)	1.56(-5)	5.29(-5)§	9.09(-5)	
10	4.61(-1)	4.18(-6)	9.89(-5)	1.49(-5)	5.35(-5)§	8.35(-5)	
11	2.16(-1)	4.04(-6)	8.76(-5)	1.42(-5)	5.58(-5)§	7.74(-5)	
12	1.19(-1)	3.93(-6)	7.87(-5)	1.36(-5)	5.98(-5)§	7.22(-5)	
13	6.92(-2)	3.85(-6)‡	7.16(-5)	1.32(-5)	6.10(-5)§	6.77(-5)	
14	4.36(-2)	3.78(-6)‡	6.58(-5)	1.28(-5)	6.30(-5)§	6.39(-5)	
15	2.98(-2)	3.74(-6)‡	6.11(-5)	1.24(-5)	6.49(-5)§	6.05(-5)	
16	2.11(-2)	3.72(-6)‡	5.72(-5)	1.21(-5)	6.73(-5)§	5.75(-5)	
17	1.58(-2)	3.72(-6)‡	5.39(-5)	1.18(-5)	6.88(-5)§	5.49(-5)	
18	1.24(-2)	3.73(-6)‡	5.12(-5)§	1.16(-5)§	7.20(-5)§	5.25(-5)	
19	1.00(-2)	3.76(-6)‡	4.89(-5)§	1.14(-5)§	7.37(-5)§	5.03(-5)§	
20	8.44(-3)	3.80(-6)‡	4.71(-5)§	1.13(-5)§	7.62(-5)§	4.83(-5)§	
21	7.32(-3)	3.84(-6)‡	4.56(-5)§	1.11(-5)§	7.99(-5)§	4.65(-5)§	

*Read as 1.13×10^{-5}.

†Value depends considerably on the spin component and rotational level, and also on the unknown (but slow) rate of radiative decay to the ground state.

‡Actual lifetime shorter due to predissociation.

§Value may be significantly too large due to omission of transitions to high vibrational levels of lower electronic states.

Table 19. Calculated radiative lifetimes (s) of N_2, N_2^+, and O_2^+ states as a function of vibrational level. – Continued

v	$N_2\ E\ ^3\Sigma_g^+$	$N_2\ D\ ^3\Sigma_u^+$	$N_2^+\ A\ ^2\Pi_u$	$N_2^+\ B\ ^2\Sigma_u^+$	$N_2^+\ C\ ^2\Sigma_u^+$	$O_2^+\ A\ ^2\Pi_u$	$O_2^+\ b\ ^4\Sigma_g^-$
0	1.90(-4)*	1.41(-8)	1.60(-5)	6.23(-8)	6.81(-8)	5.97(-7)	1.46(-6)
1	7.49(-5)		1.33(-5)	6.20(-8)	6.62(-8)	6.09(-7)	1.49(-6)
2			1.15(-5)	6.19(-8)	6.42(-8)	6.23(-7)	1.54(-6)
3			1.03(-5)	6.23(-8)	6.23(-8)‡	6.37(-7)	1.60(-6)
4			9.32(-6)	6.30(-8)	6.06(-8)‡	6.53(-7)	1.69(-6)‡
5			8.61(-6)	6.44(-8)	5.91(-8)‡	6.71(-7)	1.79(-6)‡
6			8.05(-6)	6.64(-8)	5.79(-8)‡	6.90(-7)	1.91(-6)‡
7			7.59(-6)	6.94(-8)	5.70(-8)‡	7.11(-7)	2.07(-6)‡
8			7.22(-6)	7.36(-8)	5.65(-8)‡	7.34(-7)	2.25(-6)‡
9			6.91(-6)	7.95(-8)	5.64(-8)‡	7.58(-7)	2.47(-6)‡
10			6.66(-6)	8.75(-8)	5.69(-8)‡	7.85(-7)	2.70(-6)‡
11			6.44(-6)			8.18(-7)	2.94(-6)‡
12			6.25(-6)			8.67(-7)†	3.18(-6)‡
13			6.10(-6)			9.15(-7)†	3.46(-6)‡
14			5.96(-6)			9.54(-7)†	3.88(-6)‡
15			5.85(-6)			1.01(-6)†	4.48(-6)‡
16			5.75(-6)			1.06(-6)†	
17			5.67(-6)			1.11(-6)†	
18			5.61(-6)†			1.18(-6)†	
19			5.56(-6)†			1.25(-6)†	
20			5.53(-6)†			1.33(-6)†	
21			5.50(-6)†			1.42(-6)†	

*Read as 1.90×10^{-4}.

†Value may be significantly too large due to omission of transitions to high vibrational levels of lower electronic states.

‡Actual lifetime shorter due to predissociation.

Table 20. Franck-Condon factors for N_2 $B\ ^3\Pi_g$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	6.11(-2)*	1.91(-1)	2.74(-1)	2.41(-1)	1.44(-1)	6.24(-2)	2.03(-2)	5.02(-3)	9.65(-4)	1.44(-4)	1.68(-5)
1	1.47(-1)	1.93(-1)	4.50(-2)	1.59(-2)	1.42(-1)	2.05(-1)	1.51(-1)	7.14(-2)	2.37(-2)	5.76(-3)	1.05(-3)
2	1.95(-1)	6.54(-2)	2.39(-2)	1.30(-1)	4.81(-2)	9.67(-3)	1.24(-1)	1.86(-1)	1.34(-1)	6.02(-2)	1.86(-2)
3	1.90(-1)	7.17(-4)	1.05(-1)	3.60(-2)	3.09(-2)	1.11(-1)	2.50(-2)	2.43(-2)	1.41(-1)	1.72(-1)	1.08(-1)
4	1.51(-1)	2.58(-2)	8.38(-2)	7.32(-3)	9.25(-2)	6.91(-3)	5.99(-2)	8.84(-2)	3.07(-3)	5.97(-2)	1.62(-1)
5	1.05(-1)	7.60(-2)	2.07(-2)	6.56(-2)	2.61(-2)	4.12(-2)	6.26(-2)	3.07(-3)	8.95(-2)	4.75(-2)	5.91(-3)
6	6.65(-2)	1.04(-1)	5.33(-4)	7.50(-2)	3.74(-3)	7.11(-2)	4.31(-5)	7.35(-2)	1.72(-2)	3.77(-2)	8.79(-2)
7	3.90(-2)	1.03(-1)	2.49(-2)	3.34(-2)	4.62(-2)	1.87(-2)	4.58(-2)	2.77(-2)	2.91(-2)	5.98(-2)	1.36(-3)
8	2.16(-2)	8.39(-2)	5.85(-2)	2.39(-3)	6.37(-2)	2.54(-3)	5.61(-2)	4.27(-3)	6.02(-2)	1.75(-4)	6.72(-2)
9	1.15(-2)	6.04(-2)	7.72(-2)	6.14(-3)	3.82(-2)	3.48(-2)	1.36(-2)	4.60(-2)	9.13(-3)	4.67(-2)	1.79(-2)
10	5.92(-3)	3.98(-2)	7.73(-2)	3.00(-2)	8.13(-3)	5.38(-2)	1.89(-3)	4.50(-2)	1.03(-2)	4.06(-2)	1.15(-2)
11	2.98(-3)	2.46(-2)	6.55(-2)	5.24(-2)	4.98(-4)	3.91(-2)	2.70(-2)	1.05(-2)	4.35(-2)	1.75(-3)	4.88(-2)
12	1.48(-3)	1.45(-2)	4.96(-2)	6.29(-2)	1.35(-2)	1.35(-2)	4.55(-2)	1.33(-3)	3.70(-2)	1.48(-2)	2.47(-2)
13	7.25(-4)	8.27(-3)	3.47(-2)	6.13(-2)	3.29(-2)	3.86(-4)	3.82(-2)	2.09(-2)	8.78(-3)	3.97(-2)	1.91(-5)
14	3.54(-4)	4.59(-3)	2.29(-2)	5.22(-2)	4.72(-2)	4.70(-3)	1.78(-2)	3.82(-2)	7.58(-4)	3.14(-2)	1.70(-2)
15	1.72(-4)	2.51(-3)	1.45(-2)	4.06(-2)	5.23(-2)	1.86(-2)	2.80(-3)	3.63(-2)	1.57(-2)	8.10(-3)	3.56(-2)
16	8.39(-5)	1.35(-3)	8.87(-3)	2.95(-2)	4.97(-2)	3.27(-2)	7.20(-4)	2.13(-2)	3.15(-2)	2.54(-4)	2.76(-2)
17	4.12(-5)	7.26(-4)	5.31(-3)	2.05(-2)	4.25(-2)	4.14(-2)	8.77(-3)	6.44(-3)	3.37(-2)	1.10(-2)	8.26(-3)
18	2.04(-5)	3.88(-4)	3.14(-3)	1.37(-2)	3.38(-2)	4.37(-2)	2.03(-2)	1.08(-4)	2.37(-2)	2.51(-2)	1.87(-6)
19	1.02(-5)	2.09(-4)	1.83(-3)	8.91(-3)	2.54(-2)	4.09(-2)	3.00(-2)	2.77(-3)	1.06(-2)	3.02(-2)	6.80(-3)
20	5.17(-6)	1.12(-4)	1.07(-3)	5.70(-3)	1.84(-2)	3.53(-2)	3.54(-2)	1.06(-2)	1.92(-3)	2.49(-2)	1.87(-2)
21	2.67(-6)	6.11(-5)	6.20(-4)	3.60(-3)	1.29(-2)	2.87(-2)	3.64(-2)	1.93(-2)	1.75(-4)	1.46(-2)	2.57(-2)

*Read as 6.11×10^{-2}.

Table 21. Franck-Condon factors for N_2 $W\ ^3\Delta_u$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	1.46(-3)*	1.15(-2)	4.26(-2)	9.90(-2)	1.62(-1)	1.98(-1)	1.88(-1)	1.42(-1)	8.66(-2)	4.32(-2)	1.77(-2)
1	7.46(-3)	4.25(-2)	1.04(-1)	1.38(-1)	9.47(-2)	2.00(-2)	5.18(-3)	6.77(-2)	1.38(-1)	1.54(-1)	1.18(-1)
2	2.04(-2)	8.14(-2)	1.20(-1)	6.49(-2)	1.39(-3)	3.66(-2)	9.31(-2)	6.18(-2)	3.82(-3)	2.50(-2)	1.02(-1)
3	3.97(-2)	1.06(-1)	7.80(-2)	3.31(-3)	3.56(-2)	7.72(-2)	2.25(-2)	8.07(-3)	7.07(-2)	7.01(-2)	9.81(-3)
4	6.18(-2)	1.03(-1)	2.41(-2)	1.51(-2)	6.90(-2)	2.05(-2)	1.21(-2)	6.61(-2)	2.93(-2)	4.04(-3)	6.36(-2)
5	8.18(-2)	7.73(-2)	2.40(-4)	5.17(-2)	3.75(-2)	3.44(-3)	5.62(-2)	2.26(-2)	9.58(-3)	6.10(-2)	2.41(-2)
6	9.60(-2)	4.32(-2)	1.13(-2)	5.85(-2)	2.62(-3)	3.83(-2)	3.32(-2)	3.80(-3)	5.22(-2)	1.53(-2)	1.55(-2)
7	1.02(-1)	1.53(-2)	3.60(-2)	3.41(-2)	8.17(-3)	4.76(-2)	7.60(-4)	3.93(-2)	2.23(-2)	9.91(-3)	4.96(-2)
8	1.01(-1)	1.44(-3)	5.23(-2)	7.76(-3)	3.33(-2)	2.10(-2)	1.44(-2)	3.74(-2)	6.99(-4)	4.31(-2)	8.68(-3)
9	9.43(-2)	1.69(-3)	5.15(-2)	2.67(-4)	4.36(-2)	7.12(-4)	3.77(-2)	7.15(-3)	2.63(-2)	2.22(-2)	9.33(-3)
10	8.34(-2)	1.16(-2)	3.76(-2)	1.11(-2)	3.14(-2)	7.39(-3)	3.28(-2)	2.62(-3)	3.63(-2)	4.57(-6)	3.64(-2)
11	7.07(-2)	2.55(-2)	1.99(-2)	2.74(-2)	1.17(-2)	2.58(-2)	1.11(-2)	2.23(-2)	1.48(-2)	1.64(-2)	2.23(-2)
12	5.79(-2)	3.85(-2)	6.14(-3)	3.75(-2)	5.84(-4)	3.44(-2)	2.57(-5)	3.26(-2)	5.32(-5)	3.19(-2)	7.34(-4)
13	4.61(-2)	4.79(-2)	2.14(-4)	3.70(-2)	3.05(-3)	2.72(-2)	7.38(-3)	2.20(-2)	9.42(-3)	2.06(-2)	9.04(-3)
14	3.58(-2)	5.27(-2)	1.95(-3)	2.82(-2)	1.38(-2)	1.28(-2)	2.13(-2)	5.69(-3)	2.45(-2)	3.00(-3)	2.58(-2)
15	2.72(-2)	5.33(-2)	8.92(-3)	1.63(-2)	2.47(-2)	2.08(-3)	2.80(-2)	9.71(-5)	2.61(-2)	1.95(-3)	2.36(-2)
16	2.03(-2)	5.05(-2)	1.81(-2)	6.24(-3)	2.98(-2)	5.18(-4)	2.36(-2)	7.11(-3)	1.47(-2)	1.41(-2)	8.31(-3)
17	1.50(-2)	4.56(-2)	2.69(-2)	7.81(-4)	2.79(-2)	6.63(-3)	1.29(-2)	1.78(-2)	2.96(-3)	2.31(-2)	2.62(-5)
18	1.09(-2)	3.96(-2)	3.36(-2)	4.37(-4)	2.11(-2)	1.54(-2)	3.48(-3)	2.33(-2)	3.27(-4)	2.03(-2)	5.47(-3)
19	7.83(-3)	3.33(-2)	3.77(-2)	4.16(-3)	1.25(-2)	2.21(-2)	6.80(-7)	2.06(-2)	6.41(-3)	1.01(-2)	1.58(-2)
20	5.57(-3)	2.73(-2)	3.91(-2)	1.02(-2)	5.19(-3)	2.41(-2)	2.74(-3)	1.27(-2)	1.48(-2)	1.70(-3)	2.02(-2)
21	3.92(-3)	2.18(-2)	3.81(-2)	1.69(-2)	9.17(-4)	2.16(-2)	8.98(-3)	4.73(-3)	1.94(-2)	4.20(-4)	1.59(-2)

*Read as 1.46×10^{-3}.

Table 22. Franck-Condon factors for N_2 $B'\,^3\Sigma_u^- - X\,^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	1.58(-3)*	1.23(-2)	4.50(-2)	1.03(-1)	1.66(-1)	2.00(-1)	1.87(-1)	1.38(-1)	8.26(-2)	4.02(-2)	1.61(-2)
1	8.02(-3)	4.49(-2)	1.08(-1)	1.38(-1)	9.07(-2)	1.64(-2)	7.75(-3)	7.49(-2)	1.43(-1)	1.54(-1)	1.13(-1)
2	2.18(-2)	8.48(-2)	1.20(-1)	6.08(-2)	4.97(-4)	4.19(-2)	9.49(-2)	5.66(-2)	1.76(-3)	3.18(-2)	1.11(-1)
3	4.20(-2)	1.08(-1)	7.49(-2)	1.86(-3)	4.05(-2)	7.66(-2)	1.80(-2)	1.20(-2)	7.56(-2)	6.52(-2)	5.76(-3)
4	6.49(-2)	1.03(-1)	2.07(-2)	1.88(-2)	6.97(-2)	1.62(-2)	1.66(-2)	6.76(-2)	2.36(-2)	7.74(-3)	6.95(-2)
5	8.52(-2)	7.50(-2)	8.05(-7)	5.53(-2)	3.33(-2)	6.06(-3)	5.83(-2)	1.75(-2)	1.45(-2)	6.25(-2)	1.78(-2)
6	9.91(-2)	3.98(-2)	1.45(-2)	5.78(-2)	1.08(-3)	4.28(-2)	2.85(-2)	7.13(-3)	5.36(-2)	1.02(-2)	2.22(-2)
7	1.05(-1)	1.26(-2)	4.01(-2)	3.04(-2)	1.17(-2)	4.62(-2)	2.48(-5)	4.33(-2)	1.69(-2)	1.54(-2)	4.81(-2)
8	1.02(-1)	5.92(-4)	5.45(-2)	5.12(-3)	3.74(-2)	1.66(-2)	1.93(-2)	3.38(-2)	2.81(-3)	4.46(-2)	4.28(-3)
9	9.44(-2)	3.05(-3)	5.09(-2)	1.22(-3)	4.38(-2)	2.17(-5)	4.01(-2)	3.74(-3)	3.16(-2)	1.66(-2)	1.52(-2)
10	8.25(-2)	1.47(-2)	3.48(-2)	1.48(-2)	2.80(-2)	1.13(-2)	2.96(-2)	5.82(-3)	3.45(-2)	7.66(-4)	3.81(-2)
11	6.92(-2)	2.93(-2)	1.66(-2)	3.14(-2)	8.19(-3)	3.00(-2)	7.17(-3)	2.71(-2)	9.87(-3)	2.23(-2)	1.66(-2)
12	5.60(-2)	4.22(-2)	3.98(-3)	3.96(-2)	8.97(-6)	3.49(-2)	4.06(-4)	3.25(-2)	4.66(-4)	3.24(-2)	3.01(-5)
13	4.40(-2)	5.08(-2)	4.29(-6)	3.63(-2)	5.77(-3)	2.42(-2)	1.17(-2)	1.77(-2)	1.46(-2)	1.56(-2)	1.48(-2)
14	3.38(-2)	5.45(-2)	3.69(-3)	2.55(-2)	1.81(-2)	9.02(-3)	2.54(-2)	2.54(-3)	2.78(-2)	6.00(-4)	2.85(-2)
15	2.54(-2)	5.39(-2)	1.20(-2)	1.31(-2)	2.82(-2)	5.20(-4)	2.88(-2)	1.41(-3)	2.41(-2)	5.53(-3)	1.97(-2)
16	1.87(-2)	5.01(-2)	2.17(-2)	3.92(-3)	3.11(-2)	2.14(-3)	2.09(-2)	1.16(-2)	1.01(-2)	1.93(-2)	3.87(-3)
17	1.36(-2)	4.44(-2)	3.02(-2)	1.01(-4)	2.68(-2)	1.04(-2)	9.10(-3)	2.19(-2)	6.71(-4)	2.44(-2)	8.44(-4)
18	9.78(-3)	3.79(-2)	3.62(-2)	1.50(-3)	1.84(-2)	1.95(-2)	1.25(-3)	2.42(-2)	2.28(-3)	1.70(-2)	1.05(-2)
19	6.95(-3)	3.13(-2)	3.93(-2)	6.58(-3)	9.56(-3)	2.47(-2)	5.97(-4)	1.83(-2)	1.10(-2)	5.79(-3)	2.00(-2)
20	4.89(-3)	2.53(-2)	3.95(-2)	1.33(-2)	3.04(-3)	2.47(-2)	5.75(-3)	9.07(-3)	1.88(-2)	1.05(-4)	2.00(-2)
21	3.42(-3)	2.00(-2)	3.77(-2)	2.00(-2)	1.44(-4)	2.02(-2)	1.30(-2)	2.05(-3)	2.06(-2)	2.67(-3)	1.21(-2)

*Read as 1.58×10^{-3}.

Table 23. Franck-Condon factors for N_2 $a'\ ^1\Sigma_u^- - X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	1.89(-3)*	1.42(-2)	5.06(-2)	1.12(-1)	1.75(-1)	2.04(-1)	1.83(-1)	1.31(-1)	7.48(-2)	3.49(-2)	1.33(-2)
1	9.35(-3)	5.03(-2)	1.15(-1)	1.39(-1)	8.17(-2)	9.91(-3)	1.44(-2)	8.91(-2)	1.51(-1)	1.51(-1)	1.04(-1)
2	2.48(-2)	9.16(-2)	1.20(-1)	5.18(-2)	7.48(-5)	5.27(-2)	9.62(-2)	4.59(-2)	1.26(-5)	4.57(-2)	1.24(-1)
3	4.69(-2)	1.12(-1)	6.75(-2)	1.88(-4)	5.00(-2)	7.33(-2)	1.02(-2)	2.12(-2)	8.24(-2)	5.48(-2)	1.11(-3)
4	7.10(-2)	1.02(-1)	1.43(-2)	2.66(-2)	6.90(-2)	9.18(-3)	2.60(-2)	6.78(-2)	1.41(-2)	1.68(-2)	7.71(-2)
5	9.14(-2)	6.93(-2)	7.37(-4)	6.09(-2)	2.52(-2)	1.25(-2)	5.97(-2)	9.44(-3)	2.46(-2)	6.16(-2)	8.48(-3)
6	1.04(-1)	3.30(-2)	2.11(-2)	5.47(-2)	1.29(-6)	4.93(-2)	1.98(-2)	1.49(-2)	5.29(-2)	3.42(-3)	3.41(-2)
7	1.08(-1)	7.99(-3)	4.65(-2)	2.32(-2)	1.90(-2)	4.17(-2)	1.17(-3)	4.78(-2)	8.70(-3)	2.58(-2)	4.23(-2)
8	1.04(-1)	5.02(-7)	5.70(-2)	1.68(-3)	4.32(-2)	9.68(-3)	2.79(-2)	2.61(-2)	8.94(-3)	4.34(-2)	3.35(-4)
9	9.36(-2)	6.40(-3)	4.81(-2)	4.40(-3)	4.20(-2)	1.05(-3)	4.15(-2)	4.23(-4)	3.81(-2)	8.27(-3)	2.54(-2)
10	8.03(-2)	2.06(-2)	2.91(-2)	2.18(-2)	2.14(-2)	1.86(-2)	2.27(-2)	1.28(-2)	2.89(-2)	5.28(-3)	3.68(-2)
11	6.60(-2)	3.60(-2)	1.12(-2)	3.72(-2)	3.48(-3)	3.51(-2)	2.33(-3)	3.30(-2)	3.63(-3)	3.01(-2)	8.19(-3)
12	5.24(-2)	4.82(-2)	1.28(-3)	4.10(-2)	9.99(-4)	3.33(-2)	3.47(-3)	2.95(-2)	4.16(-3)	2.94(-2)	2.86(-3)
13	4.04(-2)	5.51(-2)	9.26(-4)	3.34(-2)	1.14(-2)	1.81(-2)	1.90(-2)	1.06(-2)	2.24(-2)	7.98(-3)	2.33(-2)
14	3.03(-2)	5.68(-2)	7.70(-3)	2.02(-2)	2.47(-2)	3.94(-3)	2.98(-2)	9.51(-5)	2.94(-2)	4.59(-4)	2.83(-2)
15	2.23(-2)	5.42(-2)	1.78(-2)	8.10(-3)	3.21(-2)	1.89(-4)	2.70(-2)	5.94(-3)	1.85(-2)	1.27(-2)	1.22(-2)
16	1.61(-2)	4.88(-2)	2.79(-2)	1.16(-3)	3.10(-2)	6.53(-3)	1.51(-2)	1.86(-2)	4.12(-3)	2.48(-2)	2.60(-4)
17	1.15(-2)	4.20(-2)	3.56(-2)	3.94(-4)	2.33(-2)	1.68(-2)	3.95(-3)	2.57(-2)	3.01(-4)	2.26(-2)	5.57(-3)
18	8.10(-3)	3.49(-2)	4.00(-2)	4.57(-3)	1.34(-2)	2.47(-2)	5.40(-6)	2.25(-2)	7.62(-3)	1.06(-2)	1.78(-2)
19	5.64(-3)	2.81(-2)	4.13(-2)	1.15(-2)	5.15(-3)	2.68(-2)	3.77(-3)	1.30(-2)	1.76(-2)	1.23(-3)	2.24(-2)
20	3.90(-3)	2.21(-2)	3.99(-2)	1.89(-2)	6.61(-4)	2.32(-2)	1.15(-2)	3.95(-3)	2.22(-2)	1.20(-3)	1.60(-2)
21	2.68(-3)	1.71(-2)	3.67(-2)	2.53(-2)	3.39(-4)	1.63(-2)	1.87(-2)	4.98(-5)	1.91(-2)	8.33(-3)	5.88(-3)

*Read as 1.89×10^{-3}.

Table 24. Franck-Condon factors for N_2 $w\ ^1\Delta_u$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	2.91(-3)*	2.04(-2)	6.67(-2)	1.37(-1)	1.95(-1)	2.07(-1)	1.70(-1)	1.10(-1)	5.67(-2)	2.37(-2)	8.04(-3)
1	1.36(-2)	6.58(-2)	1.33(-1)	1.34(-1)	5.70(-2)	5.53(-4)	3.91(-2)	1.23(-1)	1.63(-1)	1.36(-1)	8.14(-2)
2	3.40(-2)	1.09(-1)	1.15(-1)	2.95(-2)	7.59(-3)	7.88(-2)	8.88(-2)	1.99(-2)	8.76(-3)	8.49(-2)	1.48(-1)
3	6.06(-2)	1.19(-1)	4.70(-2)	3.81(-3)	7.14(-2)	5.65(-2)	1.22(-4)	5.00(-2)	8.56(-2)	2.57(-2)	5.82(-3)
4	8.66(-2)	9.43(-2)	2.88(-3)	4.82(-2)	5.82(-2)	7.88(-5)	5.15(-2)	5.51(-2)	3.77(-4)	4.73(-2)	7.88(-2)
5	1.05(-1)	5.27(-2)	9.19(-3)	6.77(-2)	7.58(-3)	3.43(-2)	5.07(-2)	4.13(-7)	5.13(-2)	4.44(-2)	4.34(-4)
6	1.14(-1)	1.74(-2)	3.95(-2)	4.05(-2)	7.11(-3)	5.56(-2)	3.17(-3)	3.87(-2)	3.74(-2)	2.71(-3)	5.78(-2)
7	1.12(-1)	9.90(-4)	5.95(-2)	7.73(-3)	3.83(-2)	2.41(-2)	1.53(-2)	4.50(-2)	8.13(-5)	4.80(-2)	1.84(-2)
8	1.02(-1)	3.50(-3)	5.61(-2)	1.19(-3)	4.90(-2)	2.08(-4)	4.40(-2)	7.05(-3)	3.08(-2)	2.67(-2)	8.94(-3)
9	8.77(-2)	1.76(-2)	3.67(-2)	1.78(-2)	3.01(-2)	1.30(-2)	3.33(-2)	5.79(-3)	4.01(-2)	1.85(-4)	4.30(-2)
10	7.18(-2)	3.47(-2)	1.55(-2)	3.71(-2)	6.98(-3)	3.50(-2)	6.50(-3)	3.15(-2)	1.05(-2)	2.51(-2)	2.00(-2)
11	5.65(-2)	4.87(-2)	2.45(-3)	4.43(-2)	2.63(-4)	3.79(-2)	1.56(-3)	3.52(-2)	1.40(-3)	3.59(-2)	2.12(-4)
12	4.30(-2)	5.66(-2)	4.87(-4)	3.74(-2)	1.03(-2)	2.22(-2)	1.77(-2)	1.51(-2)	2.07(-2)	1.33(-2)	2.04(-2)
13	3.19(-2)	5.85(-2)	7.00(-3)	2.31(-2)	2.53(-2)	5.40(-3)	3.17(-2)	5.01(-4)	3.23(-2)	2.17(-5)	3.22(-2)
14	2.31(-2)	5.56(-2)	1.75(-2)	9.48(-3)	3.42(-2)	8.47(-5)	3.00(-2)	5.50(-3)	2.16(-2)	1.21(-2)	1.58(-2)
15	1.65(-2)	4.96(-2)	2.78(-2)	1.51(-3)	3.34(-2)	6.68(-3)	1.69(-2)	1.98(-2)	5.01(-3)	2.66(-2)	5.86(-4)

*Read as 2.91×10^{-3}.

Table 25. Franck-Condon factors for N_2 $C\ ^3\Pi_u$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	5.45(-1)*	3.47(-1)	9.28(-2)	1.39(-2)	1.34(-3)	9.78(-5)	6.49(-6)	4.30(-7)	3.19(-8)	3.59(-9)	1.09(-9)
1	3.08(-1)	7.92(-2)	3.59(-1)	1.99(-1)	4.77(-2)	6.68(-3)	6.84(-4)	6.24(-5)	5.82(-6)	6.99(-7)	7.82(-8)
2	1.06(-1)	2.67(-1)	2.68(-3)	2.31(-1)	2.68(-1)	1.00(-1)	2.02(-2)	2.89(-3)	3.72(-4)	4.83(-5)	7.25(-6)
3	3.00(-2)	1.83(-1)	1.28(-1)	7.49(-2)	8.80(-2)	2.73(-1)	1.63(-1)	4.78(-2)	9.74(-3)	1.76(-3)	3.05(-4)
4	7.74(-3)	7.94(-2)	1.84(-1)	2.25(-2)	1.50(-1)	5.91(-3)	2.04(-1)	2.15(-1)	9.49(-2)	2.78(-2)	6.86(-3)

*Read as 5.45×10^{-1}.

Table 26. Franck-Condon factors for N_2 $E\ ^3\Sigma_g^+$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	9.29(-1)*	6.93(-2)	1.86(-3)	2.31(-5)	2.01(-7)	7.69(-9)	4.47(-13)	8.00(-11)	1.51(-11)	1.50(-11)	1.59(-11)
1	6.76(-2)	7.93(-1)	1.33(-1)	5.75(-3)	1.07(-4)	1.38(-6)	7.07(-8)	4.09(-11)	1.20(-12)	4.71(-11)	2.12(-11)

*Read as 9.29×10^{-1}.

Table 27. Franck-Condon factors for N_2 $D\ ^3\Sigma_u^+$–$X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	9.84(-1)*	1.54(-2)	4.60(-4)	2.24(-6)	2.18(-7)	2.59(-8)	5.97(-9)	4.81(-12)	3.17(-10)	5.84(-11)	2.06(-16)

*Read as 9.84×10^{-1}.

Table 28. Franck-Condon factors for N_2^+ $X\ ^2\Sigma_g^+$-N_2 $X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	9.17(-1)*	8.02(-2)	2.53(-3)	4.47(-5)	4.17(-7)	1.26(-8)	2.10(-10)	1.01(-10)	2.09(-11)	5.10(-12)	1.35(-12)
1	7.79(-2)	7.60(-1)	1.54(-1)	7.91(-3)	2.04(-4)	2.57(-6)	9.23(-8)	1.28(-9)	8.14(-10)	1.83(-10)	5.16(-11)
2	4.65(-3)	1.45(-1)	6.12(-1)	2.21(-1)	1.65(-2)	5.84(-4)	9.55(-6)	3.96(-7)	4.23(-9)	3.74(-9)	9.13(-10)
3	2.68(-4)	1.38(-2)	2.01(-1)	4.75(-1)	2.80(-1)	2.86(-2)	1.34(-3)	2.78(-5)	1.31(-6)	9.68(-9)	1.28(-8)
4	1.76(-5)	1.12(-3)	2.72(-2)	2.44(-1)	3.51(-1)	3.29(-1)	4.46(-2)	2.68(-3)	6.99(-5)	3.66(-6)	1.63(-8)
5	1.55(-6)	9.62(-5)	2.89(-3)	4.45(-2)	2.74(-1)	2.42(-1)	3.67(-1)	6.46(-2)	4.91(-3)	1.59(-4)	9.21(-6)
6	2.13(-7)	1.06(-5)	3.14(-4)	6.00(-3)	6.50(-2)	2.90(-1)	1.50(-1)	3.91(-1)	8.87(-2)	8.42(-3)	3.34(-4)
7	4.74(-8)	1.71(-6)	4.18(-5)	7.97(-4)	1.08(-2)	8.78(-2)	2.91(-1)	7.83(-2)	4.01(-1)	1.17(-1)	1.37(-2)
8	1.47(-8)	4.21(-7)	7.79(-6)	1.25(-4)	1.72(-3)	1.78(-2)	1.11(-1)	2.76(-1)	2.90(-2)	3.94(-1)	1.48(-1)
9	5.49(-9)	1.42(-7)	2.11(-6)	2.65(-5)	3.16(-4)	3.34(-3)	2.71(-2)	1.34(-1)	2.47(-1)	3.68(-3)	3.70(-1)
10	2.24(-9)	5.67(-8)	7.58(-7)	7.79(-6)	7.48(-5)	7.01(-4)	5.94(-3)	3.89(-2)	1.54(-1)	2.05(-1)	2.24(-3)
11	9.69(-10)	2.50(-8)	3.24(-7)	2.98(-6)	2.37(-5)	1.84(-4)	1.42(-3)	9.88(-3)	5.30(-2)	1.67(-1)	1.55(-1)
12	4.42(-10)	1.17(-8)	1.53(-7)	1.35(-6)	9.59(-6)	6.28(-5)	4.11(-4)	2.66(-3)	1.55(-2)	6.86(-2)	1.71(-1)
13	2.13(-10)	5.77(-9)	7.65(-8)	6.73(-7)	4.56(-6)	2.67(-5)	1.50(-4)	8.41(-4)	4.66(-3)	2.30(-2)	8.44(-2)
14	1.10(-10)	2.99(-9)	4.03(-8)	3.59(-7)	2.40(-6)	1.33(-5)	6.67(-5)	3.26(-4)	1.61(-3)	7.71(-3)	3.24(-2)
15	6.01(-11)	1.64(-9)	2.23(-8)	2.01(-7)	1.35(-6)	7.33(-6)	3.46(-5)	1.52(-4)	6.61(-4)	2.88(-3)	1.21(-2)
16	3.50(-11)	9.50(-10)	1.30(-8)	1.18(-7)	7.97(-7)	4.31(-6)	1.98(-5)	8.17(-5)	3.21(-4)	1.26(-3)	4.88(-3)
17	2.15(-11)	5.81(-10)	7.95(-9)	7.24(-8)	4.92(-7)	2.67(-6)	1.21(-5)	4.85(-5)	1.78(-4)	6.35(-4)	2.24(-3)
18	1.38(-11)	3.74(-10)	5.10(-9)	4.64(-8)	3.17(-7)	1.72(-6)	7.82(-6)	3.07(-5)	1.09(-4)	3.62(-4)	1.18(-3)
19	9.28(-12)	2.52(-10)	3.42(-9)	3.10(-8)	2.12(-7)	1.15(-6)	5.24(-6)	2.05(-5)	7.11(-5)	2.27(-4)	6.91(-4)
20	6.50(-12)	1.77(-10)	2.39(-9)	2.16(-8)	1.47(-7)	8.01(-7)	3.64(-6)	1.42(-5)	4.88(-5)	1.52(-4)	4.42(-4)
21	4.74(-12)	1.29(-10)	1.73(-9)	1.56(-8)	1.06(-7)	5.74(-7)	2.61(-6)	1.02(-5)	3.47(-5)	1.07(-4)	3.02(-4)

*Read as 9.17×10^{-1}.

Table 29. Franck-Condon factors for N_2^+ $A\ ^2\Pi_u$–N_2 $X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	2.64(-1)*	3.79(-1)	2.41(-1)	8.98(-2)	2.19(-2)	3.68(-3)	4.39(-4)	3.78(-5)	2.37(-6)	1.08(-7)	3.50(-9)
1	3.18(-1)	2.97(-2)	1.03(-1)	2.67(-1)	1.92(-1)	7.15(-2)	1.64(-2)	2.52(-3)	2.68(-4)	2.01(-5)	1.07(-6)
2	2.19(-1)	5.01(-2)	1.60(-1)	5.57(-5)	1.49(-1)	2.35(-1)	1.35(-1)	4.20(-2)	8.16(-3)	1.06(-3)	9.39(-5)
3	1.15(-1)	1.57(-1)	1.02(-2)	1.30(-1)	5.76(-2)	3.60(-2)	2.04(-1)	1.89(-1)	7.97(-2)	1.95(-2)	3.06(-3)
4	5.09(-2)	1.62(-1)	3.45(-2)	8.45(-2)	3.70(-2)	1.21(-1)	1.44(-4)	1.27(-1)	2.12(-1)	1.24(-1)	3.83(-2)
5	2.04(-2)	1.11(-1)	1.09(-1)	1.39(-3)	1.13(-1)	3.09(-5)	1.18(-1)	3.21(-2)	4.98(-2)	1.98(-1)	1.65(-1)
6	7.70(-3)	6.07(-2)	1.25(-1)	3.31(-2)	4.20(-2)	7.32(-2)	2.94(-2)	6.62(-2)	8.35(-2)	5.41(-3)	1.52(-1)
7	2.80(-3)	2.92(-2)	9.57(-2)	8.74(-2)	1.29(-4)	8.27(-2)	1.95(-2)	7.43(-2)	1.54(-2)	1.11(-1)	4.94(-3)
8	1.00(-3)	1.30(-2)	5.92(-2)	1.01(-1)	3.34(-2)	1.88(-2)	8.08(-2)	1.25(-4)	8.95(-2)	4.48(-4)	9.89(-2)
9	3.58(-4)	5.51(-3)	3.21(-2)	8.22(-2)	7.35(-2)	2.05(-3)	5.47(-2)	4.49(-2)	2.06(-2)	6.64(-2)	2.22(-2)
10	1.29(-4)	2.28(-3)	1.61(-2)	5.50(-2)	8.41(-2)	3.28(-2)	7.38(-3)	7.12(-2)	9.57(-3)	5.39(-2)	2.78(-2)
11	4.76(-5)	9.33(-4)	7.66(-3)	3.26(-2)	7.11(-2)	6.31(-2)	4.46(-3)	3.44(-2)	5.65(-2)	7.75(-4)	6.98(-2)
12	1.80(-5)	3.84(-4)	3.55(-3)	1.79(-2)	5.05(-2)	7.14(-2)	3.11(-2)	2.43(-3)	5.66(-2)	2.57(-2)	1.90(-2)
13	7.03(-6)	1.60(-4)	1.62(-3)	9.36(-3)	3.21(-2)	6.22(-2)	5.44(-2)	6.20(-3)	2.14(-2)	5.65(-2)	3.07(-3)
14	2.84(-6)	6.79(-5)	7.44(-4)	4.76(-3)	1.90(-2)	4.63(-2)	6.13(-2)	2.85(-2)	6.08(-4)	4.32(-2)	3.61(-2)
15	1.18(-6)	2.95(-5)	3.43(-4)	2.39(-3)	1.08(-2)	3.13(-2)	5.49(-2)	4.70(-2)	6.98(-3)	1.35(-2)	5.09(-2)
16	5.10(-7)	1.32(-5)	1.60(-4)	1.20(-3)	5.93(-3)	1.98(-2)	4.28(-2)	5.30(-2)	2.55(-2)	8.57(-5)	3.28(-2)
17	2.26(-7)	6.01(-6)	7.62(-5)	6.01(-4)	3.22(-3)	1.20(-2)	3.04(-2)	4.89(-2)	4.05(-2)	6.94(-3)	8.97(-3)
18	1.03(-7)	2.81(-6)	3.69(-5)	3.04(-4)	1.74(-3)	7.08(-3)	2.04(-2)	3.97(-2)	4.62(-2)	2.22(-2)	6.74(-7)
19	4.75(-8)	1.34(-6)	1.81(-5)	1.56(-4)	9.38(-4)	4.11(-3)	1.31(-2)	2.96(-2)	4.38(-2)	3.47(-2)	6.32(-3)
20	2.23(-8)	6.48(-7)	9.06(-6)	8.07(-5)	5.08(-4)	2.37(-3)	8.21(-3)	2.09(-2)	3.69(-2)	4.03(-2)	1.89(-2)
21	1.05(-8)	3.17(-7)	4.58(-6)	4.22(-5)	2.77(-4)	1.36(-3)	5.05(-3)	1.42(-2)	2.88(-2)	3.93(-2)	2.96(-2)

*Read as 2.64×10^{-1}.

Table 30. Franck-Condon factors for N_2^+ $B\ ^2\Sigma_u^+$–N_2 $X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	8.83(-1)*	1.04(-1)	1.18(-2)	1.21(-3)	1.27(-4)	1.35(-5)	1.48(-6)	1.64(-7)	1.99(-8)	3.43(-9)	1.25(-9)
1	1.14(-1)	6.91(-1)	1.61(-1)	2.86(-2)	3.93(-3)	5.17(-4)	6.63(-5)	8.64(-6)	1.18(-6)	1.89(-7)	4.56(-8)
2	2.31(-3)	2.00(-1)	5.57(-1)	1.86(-1)	4.59(-2)	7.81(-3)	1.25(-3)	1.88(-4)	2.91(-5)	4.86(-6)	1.01(-6)
3	1.41(-5)	4.85(-3)	2.64(-1)	4.69(-1)	1.87(-1)	6.12(-2)	1.22(-2)	2.33(-3)	4.08(-4)	7.46(-5)	1.52(-5)
4	4.32(-6)	1.32(-4)	6.01(-3)	3.09(-1)	4.19(-1)	1.71(-1)	7.37(-2)	1.65(-2)	3.74(-3)	7.46(-4)	1.62(-4)
5	8.23(-10)	1.97(-5)	5.92(-4)	4.91(-3)	3.39(-1)	4.00(-1)	1.45(-1)	8.41(-2)	2.00(-2)	5.44(-3)	1.22(-3)
6	1.27(-8)	2.28(-7)	4.48(-5)	1.81(-3)	1.99(-3)	3.51(-1)	4.09(-1)	1.10(-1)	9.41(-2)	2.18(-2)	7.48(-3)
7	1.25(-11)	8.34(-8)	3.13(-6)	5.44(-5)	4.25(-3)	5.49(-6)	3.41(-1)	4.41(-1)	7.14(-2)	1.07(-1)	2.12(-2)
8	1.59(-10)	1.80(-9)	1.99(-7)	1.92(-5)	1.59(-5)	7.92(-3)	5.47(-3)	3.01(-1)	4.88(-1)	3.43(-2)	1.26(-1)
9	4.98(-11)	1.47(-9)	3.08(-8)	5.59(-8)	7.07(-5)	4.91(-5)	1.14(-2)	2.93(-2)	2.23(-1)	5.32(-1)	7.61(-3)
10	1.50(-11)	7.92(-10)	4.18(-9)	2.10(-7)	1.24(-6)	1.62(-4)	8.63(-4)	1.12(-2)	8.25(-2)	1.17(-1)	5.36(-1)

*Read as 8.83×10^{-1}.

Table 31. Franck-Condon factors for N_2^+ $C\ ^2\Sigma_u^+$-N_2 $X\ ^1\Sigma_g^+$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	2.75(-3)*	2.17(-2)	7.78(-2)	1.66(-1)	2.35(-1)	2.30(-1)	1.59(-1)	7.68(-2)	2.53(-2)	5.34(-3)	6.29(-4)
1	1.40(-2)	7.33(-2)	1.50(-1)	1.36(-1)	3.42(-2)	8.96(-3)	1.15(-1)	2.01(-1)	1.66(-1)	7.77(-2)	2.09(-2)
2	3.73(-2)	1.22(-1)	1.18(-1)	1.53(-2)	3.04(-2)	1.07(-1)	4.67(-2)	5.85(-3)	1.21(-1)	2.01(-1)	1.39(-1)
3	6.87(-2)	1.30(-1)	3.56(-2)	1.71(-2)	8.75(-2)	2.08(-2)	2.63(-2)	9.44(-2)	2.07(-2)	3.40(-2)	1.77(-1)
4	9.91(-2)	9.35(-2)	3.38(-7)	6.96(-2)	3.24(-2)	1.70(-2)	7.22(-2)	3.99(-3)	5.41(-2)	7.01(-2)	2.51(-4)
5	1.19(-1)	4.32(-2)	2.39(-2)	6.27(-2)	6.86(-4)	6.27(-2)	9.42(-3)	4.03(-2)	4.46(-2)	7.09(-3)	8.25(-2)
6	1.25(-1)	8.42(-3)	5.81(-2)	1.90(-2)	3.39(-2)	3.30(-2)	1.52(-2)	4.89(-2)	1.94(-3)	6.08(-2)	4.28(-3)
7	1.18(-1)	3.92(-4)	6.53(-2)	3.59(-5)	5.43(-2)	3.63(-4)	4.93(-2)	3.08(-3)	4.46(-2)	1.12(-2)	3.65(-2)
8	1.03(-1)	1.26(-2)	4.58(-2)	1.61(-2)	3.33(-2)	1.66(-2)	2.99(-2)	1.52(-2)	3.16(-2)	1.21(-2)	3.80(-2)
9	8.35(-2)	3.23(-2)	1.97(-2)	3.93(-2)	6.08(-3)	4.06(-2)	1.83(-3)	4.05(-2)	5.99(-4)	4.11(-2)	4.08(-4)
10	6.46(-2)	4.92(-2)	3.12(-3)	4.69(-2)	1.18(-3)	3.66(-2)	7.73(-3)	2.69(-2)	1.47(-2)	2.00(-2)	2.04(-2)

*Read as 2.75×10^{-3}.

Table 32. Franck-Condon factors for O_2^+ $X\ ^2\Pi_g$–O_2 $X\ ^3\Sigma_g^-$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	1.86(-1)*	2.71(-1)	2.30(-1)	1.50(-1)	8.40(-2)	4.24(-2)	2.00(-2)	9.02(-3)	3.94(-3)	1.69(-3)	7.15(-4)
1	3.62(-1)	8.32(-2)	4.96(-3)	8.33(-2)	1.34(-1)	1.25(-1)	8.98(-2)	5.53(-2)	3.09(-2)	1.61(-2)	8.02(-3)
2	2.91(-1)	4.27(-2)	1.65(-1)	5.34(-2)	5.55(-4)	4.41(-2)	8.95(-2)	9.82(-2)	8.08(-2)	5.61(-2)	3.49(-2)
3	1.25(-1)	2.57(-1)	1.65(-2)	7.24(-2)	1.09(-1)	3.10(-2)	6.16(-4)	3.16(-2)	6.73(-2)	7.91(-2)	7.03(-2)
4	3.07(-2)	2.36(-1)	1.10(-1)	9.65(-2)	4.15(-3)	8.21(-2)	7.44(-2)	1.64(-2)	1.38(-3)	2.65(-2)	5.45(-2)
5	4.33(-3)	9.10(-2)	2.67(-1)	1.57(-2)	1.28(-1)	1.32(-2)	2.82(-2)	7.66(-2)	4.89(-2)	7.60(-3)	2.61(-3)
6	3.26(-4)	1.73(-2)	1.61(-1)	2.25(-1)	3.47(-3)	9.76(-2)	3.42(-2)	8.73(-4)	4.67(-2)	6.33(-2)	3.07(-2)
7	1.07(-5)	1.60(-3)	4.06(-2)	2.20(-1)	1.51(-1)	3.89(-2)	4.65(-2)	8.08(-2)	8.67(-3)	1.48(-2)	5.28(-2)
8	7.14(-8)	5.94(-5)	4.53(-3)	7.29(-2)	2.57(-1)	7.87(-2)	8.09(-2)	1.00(-2)	7.83(-2)	3.31(-2)	3.60(-4)
9	7.16(-10)	3.47(-7)	1.85(-4)	9.65(-3)	1.11(-1)	2.67(-1)	2.80(-2)	1.06(-1)	1.33(-4)	5.54(-2)	5.37(-2)
10	4.25(-11)	8.65(-9)	8.54(-7)	4.22(-4)	1.72(-2)	1.51(-1)	2.57(-1)	3.57(-3)	1.07(-1)	1.14(-2)	2.80(-2)
11	2.46(-13)	3.23(-10)	5.21(-8)	1.32(-6)	7.91(-4)	2.70(-2)	1.91(-1)	2.31(-1)	1.23(-3)	9.15(-2)	3.18(-2)
12	2.10(-14)	6.10(-12)	1.19(-9)	2.13(-7)	1.21(-6)	1.28(-3)	3.89(-2)	2.26(-1)	1.98(-1)	1.30(-2)	6.71(-2)
13	7.65(-16)	2.04(-13)	5.31(-11)	2.68(-9)	6.66(-7)	3.72(-7)	1.84(-3)	5.21(-2)	2.58(-1)	1.62(-1)	3.10(-2)
14	8.53(-16)	1.66(-14)	7.48(-13)	3.02(-10)	3.67(-9)	1.70(-6)	2.56(-7)	2.40(-3)	6.62(-2)	2.84(-1)	1.30(-1)
15	6.53(-16)	4.35(-17)	1.35(-13)	8.80(-13)	1.23(-9)	1.96(-9)	3.70(-6)	5.83(-6)	2.86(-3)	8.03(-2)	3.07(-1)
16	2.09(-15)	1.28(-17)	6.77(-17)	8.09(-13)	4.23(-17)	3.90(-9)	4.34(-10)	6.94(-6)	2.76(-5)	3.12(-3)	9.38(-2)
17	3.66(-16)	1.93(-18)	5.85(-16)	1.34(-14)	3.46(-12)	1.32(-11)	9.97(-9)	2.74(-8)	1.14(-5)	8.32(-5)	3.07(-3)
18	4.26(-16)	4.23(-17)	7.54(-17)	6.24(-17)	1.28(-13)	9.64(-12)	1.55(-10)	2.07(-8)	1.80(-7)	1.62(-5)	1.97(-4)
19	1.44(-15)	8.81(-17)	4.29(-16)	9.12(-19)	2.47(-15)	7.26(-13)	1.94(-11)	8.78(-10)	3.40(-8)	6.92(-7)	1.97(-5)
20	5.52(-16)	1.88(-17)	1.82(-16)	1.13(-18)	3.38(-15)	5.89(-16)	3.52(-12)	2.30(-11)	3.47(-9)	4.17(-8)	1.99(-6)
21	3.76(-17)	1.38(-17)	3.02(-18)	5.31(-17)	3.47(-16)	6.02(-15)	2.49(-14)	1.22(-11)	5.30(-12)	1.06(-8)	3.01(-8)

*Read as 1.86×10^{-1}.

Table 33. Franck-Condon factors for O_2^+ $a\ ^4\Pi_u$–O_2 $X\ ^3\Sigma_g^-$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	9.87(-3)*	5.44(-2)	1.38(-1)	2.15(-1)	2.30(-1)	1.78(-1)	1.05(-1)	4.72(-2)	1.67(-2)	4.64(-3)	1.02(-3)
1	3.60(-2)	1.24(-1)	1.58(-1)	7.32(-2)	5.34(-4)	5.30(-2)	1.52(-1)	1.79(-1)	1.29(-1)	6.44(-2)	2.36(-2)
2	7.20(-2)	1.42(-1)	6.01(-2)	2.33(-3)	8.29(-2)	9.51(-2)	1.32(-2)	2.37(-2)	1.23(-1)	1.68(-1)	1.26(-1)
3	1.05(-1)	1.02(-1)	1.25(-3)	6.30(-2)	6.98(-2)	2.02(-4)	6.16(-2)	8.79(-2)	1.21(-2)	2.59(-2)	1.25(-1)
4	1.24(-1)	4.61(-2)	1.98(-2)	7.67(-2)	3.27(-3)	5.10(-2)	5.84(-2)	1.05(-4)	6.65(-2)	7.39(-2)	3.35(-3)
5	1.28(-1)	8.65(-3)	5.79(-2)	3.11(-2)	2.03(-2)	6.08(-2)	8.72(-5)	5.84(-2)	3.89(-2)	6.08(-3)	7.94(-2)
6	1.18(-1)	4.45(-4)	6.88(-2)	8.06(-4)	5.57(-2)	1.17(-2)	3.51(-2)	4.08(-2)	5.33(-3)	6.58(-2)	1.44(-2)
7	1.01(-1)	1.30(-2)	5.05(-2)	1.08(-2)	4.68(-2)	4.05(-3)	5.21(-2)	1.12(-4)	5.15(-2)	1.48(-2)	2.72(-2)
8	8.17(-2)	3.27(-2)	2.34(-2)	3.57(-2)	1.54(-2)	3.24(-2)	1.90(-2)	2.44(-2)	3.15(-2)	1.05(-2)	5.02(-2)
9	6.29(-2)	4.94(-2)	4.83(-3)	4.86(-2)	9.09(-5)	4.46(-2)	6.92(-6)	4.40(-2)	3.33(-4)	4.43(-2)	5.12(-3)
10	4.67(-2)	5.87(-2)	1.05(-4)	4.30(-2)	8.32(-3)	2.92(-2)	1.47(-2)	2.43(-2)	1.61(-2)	2.68(-2)	1.25(-2)
11	3.38(-2)	6.05(-2)	5.99(-3)	2.72(-2)	2.53(-2)	8.21(-3)	3.33(-2)	2.22(-3)	3.60(-2)	1.03(-3)	3.79(-2)
12	2.40(-2)	5.67(-2)	1.64(-2)	1.16(-2)	3.61(-2)	5.45(-7)	3.38(-2)	3.93(-3)	2.77(-2)	9.12(-3)	2.48(-2)
13	1.68(-2)	4.97(-2)	2.65(-2)	2.28(-3)	3.59(-2)	5.95(-3)	1.99(-2)	1.94(-2)	7.79(-3)	2.75(-2)	2.63(-3)
14	1.16(-2)	4.16(-2)	3.34(-2)	5.70(-5)	2.76(-2)	1.75(-2)	5.73(-3)	2.92(-2)	2.88(-5)	2.84(-2)	3.65(-3)
15	8.05(-3)	3.36(-2)	3.66(-2)	2.90(-3)	1.68(-2)	2.64(-2)	3.90(-5)	2.65(-2)	7.24(-3)	1.45(-2)	1.84(-2)
16	5.58(-3)	2.66(-2)	3.66(-2)	8.05(-3)	7.76(-3)	2.90(-2)	2.99(-3)	1.62(-2)	1.85(-2)	2.36(-3)	2.57(-2)
17	3.88(-3)	2.07(-2)	3.44(-2)	1.33(-2)	2.19(-3)	2.61(-2)	1.01(-2)	6.04(-3)	2.43(-2)	5.91(-4)	1.99(-2)
18	2.72(-3)	1.60(-2)	3.10(-2)	1.75(-2)	9.01(-5)	2.02(-2)	1.70(-2)	6.51(-4)	2.24(-2)	6.90(-3)	8.90(-3)
19	1.93(-3)	1.22(-2)	2.71(-2)	2.01(-2)	4.92(-4)	1.36(-2)	2.10(-2)	4.82(-4)	1.57(-2)	1.47(-2)	1.36(-3)
20	1.38(-3)	9.41(-3)	2.31(-2)	2.12(-2)	2.27(-3)	7.89(-3)	2.17(-2)	3.68(-3)	8.32(-3)	1.93(-2)	3.43(-4)
21	1.00(-3)	7.24(-3)	1.95(-2)	2.11(-2)	4.51(-3)	3.82(-3)	1.99(-2)	7.94(-3)	2.92(-3)	1.93(-2)	4.09(-3)

*Read as 9.87×10^{-3}.

Table 34. Franck-Condon factors for O_2^+ $A\ ^2\Pi_u$-O_2 $X\ ^3\Sigma_g^-$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	2.84(-3)*	1.95(-2)	6.34(-2)	1.29(-1)	1.86(-1)	2.02(-1)	1.71(-1)	1.16(-1)	6.43(-2)	2.96(-2)	1.14(-2)
1	1.23(-2)	6.00(-2)	1.23(-1)	1.31(-1)	6.34(-2)	3.00(-3)	2.49(-2)	1.01(-1)	1.53(-1)	1.44(-1)	9.88(-2)
2	2.91(-2)	9.71(-2)	1.12(-1)	3.73(-2)	2.21(-3)	6.22(-2)	9.25(-2)	3.75(-2)	1.83(-4)	4.74(-2)	1.20(-1)
3	5.00(-2)	1.09(-1)	5.50(-2)	2.40(-4)	5.50(-2)	6.71(-2)	6.89(-3)	2.34(-2)	8.04(-2)	5.52(-2)	2.58(-3)
4	6.97(-2)	9.23(-2)	9.74(-3)	2.92(-2)	6.44(-2)	7.34(-3)	2.56(-2)	6.55(-2)	1.65(-2)	1.11(-2)	6.95(-2)
5	8.43(-2)	6.11(-2)	1.01(-3)	5.70(-2)	2.39(-2)	1.05(-2)	5.65(-2)	1.30(-2)	1.64(-2)	6.05(-2)	1.90(-2)
6	9.18(-2)	3.04(-2)	1.75(-2)	5.14(-2)	2.34(-4)	4.23(-2)	2.51(-2)	6.96(-3)	5.10(-2)	1.26(-2)	1.54(-2)
7	9.25(-2)	9.51(-3)	3.75(-2)	2.65(-2)	1.10(-2)	4.30(-2)	1.92(-4)	3.82(-2)	2.10(-2)	8.24(-3)	4.78(-2)
8	8.78(-2)	6.28(-4)	4.74(-2)	5.82(-3)	3.12(-2)	1.89(-2)	1.27(-2)	3.60(-2)	7.87(-5)	3.83(-2)	1.45(-2)
9	7.97(-2)	1.43(-3)	4.49(-2)	8.80(-5)	3.87(-2)	1.54(-3)	3.19(-2)	1.08(-2)	1.77(-2)	2.84(-2)	1.83(-3)
10	6.98(-2)	7.88(-3)	3.44(-2)	6.46(-3)	3.09(-2)	2.85(-3)	3.26(-2)	3.67(-5)	3.27(-2)	3.84(-3)	2.41(-2)
11	5.96(-2)	1.63(-2)	2.15(-2)	1.70(-2)	1.67(-2)	1.46(-2)	1.85(-2)	9.44(-3)	2.43(-2)	2.90(-3)	3.06(-2)
12	4.99(-2)	2.42(-2)	1.06(-2)	2.54(-2)	5.10(-3)	2.46(-2)	4.77(-3)	2.23(-2)	7.55(-3)	1.76(-2)	1.43(-2)
13	4.12(-2)	3.03(-2)	3.48(-3)	2.88(-2)	1.90(-4)	2.68(-2)	6.14(-7)	2.58(-2)	3.10(-5)	2.54(-2)	9.47(-4)
14	3.36(-2)	3.40(-2)	3.24(-4)	2.73(-2)	1.35(-3)	2.21(-2)	3.62(-3)	1.96(-2)	4.21(-3)	1.98(-2)	2.89(-3)
15	2.72(-2)	3.57(-2)	3.30(-4)	2.26(-2)	5.86(-3)	1.42(-2)	1.05(-2)	9.97(-3)	1.27(-2)	8.77(-3)	1.25(-2)
16	2.19(-2)	3.56(-2)	2.37(-3)	1.67(-2)	1.10(-2)	6.91(-3)	1.61(-2)	2.70(-3)	1.82(-2)	1.30(-3)	1.88(-2)
17	1.76(-2)	3.42(-2)	5.40(-3)	1.09(-2)	1.49(-2)	2.07(-3)	1.82(-2)	2.64(-5)	1.83(-2)	3.51(-4)	1.77(-2)
18	1.41(-2)	3.19(-2)	8.62(-3)	6.18(-3)	1.68(-2)	1.07(-4)	1.69(-2)	1.23(-3)	1.42(-2)	3.92(-3)	1.17(-2)
19	1.13(-2)	2.92(-2)	1.15(-2)	2.87(-3)	1.69(-2)	4.03(-4)	1.36(-2)	4.35(-3)	8.80(-3)	8.51(-3)	5.34(-3)
20	9.07(-3)	2.62(-2)	1.37(-2)	9.25(-4)	1.55(-2)	2.00(-3)	9.53(-3)	7.56(-3)	4.12(-3)	1.16(-2)	1.23(-3)
21	7.24(-3)	2.31(-2)	1.51(-2)	9.62(-5)	1.32(-2)	3.98(-3)	5.81(-3)	9.72(-3)	1.19(-3)	1.24(-2)	3.85(-8)

*Read as 2.84×10^{-3}.

Table 35. Franck-Condon factors for O_2^+ $b\ ^4\Sigma_g^-$–O_2 $X\ ^3\Sigma_g^-$.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10
0	4.11(-1)*	3.76(-1)	1.61(-1)	4.31(-2)	8.21(-3)	1.19(-3)	1.36(-4)	1.26(-5)	9.81(-7)	6.34(-8)	3.54(-9)
1	3.36(-1)	2.78(-3)	2.34(-1)	2.61(-1)	1.23(-1)	3.49(-2)	6.96(-3)	1.05(-3)	1.24(-4)	1.20(-5)	9.46(-7)
2	1.62(-1)	1.69(-1)	8.18(-2)	4.85(-2)	2.31(-1)	1.96(-1)	8.31(-2)	2.26(-2)	4.43(-3)	6.62(-4)	7.88(-5)
3	6.13(-2)	2.09(-1)	1.69(-2)	1.62(-1)	2.55(-3)	1.20(-1)	2.18(-1)	1.41(-1)	5.28(-2)	1.34(-2)	2.52(-3)
4	2.04(-2)	1.35(-1)	1.28(-1)	1.65(-2)	1.19(-1)	6.44(-2)	2.25(-2)	1.72(-1)	1.85(-1)	9.65(-2)	3.20(-2)
5	6.36(-3)	6.53(-2)	1.54(-1)	2.90(-2)	8.59(-2)	3.20(-2)	1.22(-1)	3.27(-3)	8.54(-2)	1.87(-1)	1.43(-1)
6	1.93(-3)	2.72(-2)	1.11(-1)	1.05(-1)	1.43(-3)	1.12(-1)	6.48(-4)	1.06(-1)	5.10(-2)	1.50(-2)	1.40(-1)
7	5.83(-4)	1.04(-2)	6.15(-2)	1.22(-1)	3.39(-2)	4.24(-2)	6.72(-2)	3.97(-2)	4.17(-2)	1.00(-1)	3.59(-3)
8	1.79(-4)	3.83(-3)	2.97(-2)	9.34(-2)	8.80(-2)	1.07(-4)	8.40(-2)	1.09(-2)	8.46(-2)	8.29(-4)	9.49(-2)
9	5.60(-5)	1.38(-3)	1.32(-2)	5.74(-2)	1.00(-1)	3.29(-2)	2.21(-2)	7.33(-2)	5.35(-3)	7.60(-2)	2.03(-2)
10	1.80(-5)	5.01(-4)	5.63(-3)	3.11(-2)	8.12(-2)	7.29(-2)	9.22(-4)	6.11(-2)	2.59(-2)	4.48(-2)	2.71(-2)
11	5.96(-6)	1.83(-4)	2.35(-3)	1.56(-2)	5.44(-2)	8.41(-2)	2.82(-2)	1.36(-2)	6.61(-2)	2.73(-6)	6.94(-2)
12	2.00(-6)	6.74(-5)	9.68(-4)	7.52(-3)	3.25(-2)	7.21(-2)	5.91(-2)	9.75(-4)	4.70(-2)	3.11(-2)	2.21(-2)
13	6.79(-7)	2.51(-5)	3.99(-4)	3.52(-3)	1.81(-2)	5.23(-2)	7.06(-2)	2.14(-2)	1.10(-2)	5.61(-2)	1.18(-3)
14	2.27(-7)	9.39(-6)	1.65(-4)	1.62(-3)	9.66(-3)	3.42(-2)	6.46(-2)	4.60(-2)	3.30(-4)	3.93(-2)	2.86(-2)
15	7.20(-8)	3.47(-6)	6.78(-5)	7.42(-4)	5.00(-3)	2.09(-2)	5.07(-2)	5.83(-2)	1.38(-2)	1.15(-2)	4.66(-2)

*Read as 4.11×10^{-1}.

Table 36. Band origin wavelengths and Einstein coefficients for N_2 $b\ ^1\Pi_u$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm) and $A_{v'v''}$ (s^{-1}). Band origins from Carroll and Collins (1969) and Roncin *et al.* (1987). Einstein coefficients calculated by normalizing relative band intensities measured by James *et al.* (1990) to the $v' = 1$ lifetime of 1.75 ns measured by Oertel *et al.* (1981), corrected to a radiative lifetime of 1.96 ns by allowing for 10.5% predissociation as determined by James *et al.* The other levels of the $b\ ^1\Pi_u$ state are strongly predissociated and give little emission.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8	9	10	11	12
1	0.0986	0.1009	0.1033	0.1058	0.1083	0.1110	0.1138	0.1166	0.1196	0.1227	0.1259	0.1292	0.1326
	1.04(8)*	1.04(8)	1.21(8)	7.1(7)	3.9(7)	1.5(7)	†	†	1.4(7)	1.4(7)	1.05(7)	1.05(7)	8(6)

*Read as 1.04×10^8.
†These bands were too weak to be measured by James *et al.* (1990).

Table 37. Band origin wavelengths and Einstein coefficients for N_2 $c_4'\ ^1\Sigma_u^+$–$X\ ^1\Sigma_g^+$. For each v'–v'' band, the listed quantities are $\lambda_{v'v''}$ (μm) and $A_{v'v''}$ (s^{-1}). Band origins from Yoshino and Tanaka (1977) and Roncin *et al.* (1987), or calculated from data therein. Einstein coefficients for $v'' = 0$ from Table VII of Ajello *et al.* (1989). Einstein coefficients for $v'' > 0$ from relative band intensities, $I_{v'v''}/I_{v'0}$, measured by Ajello *et al.* and James *et al.* (1990), except for $v' = 1$ and 2, where $A_{v'0}$ were too small to be measured, so $A_{2v''}$ were normalized to the $v' = 2$ radiative lifetime (0.65 ns) measured by Oertel *et al.* (1981), while $A_{1v''}$ were normalized to the average of the radiative lifetimes for $v' = 0$ (0.74 ns) deduced by Ajello *et al.* and $v' = 2$ measured by Oertel *et al.* Bands from $v' = 5$ are weak and their intensities have not been measured.

$v' \setminus v''$	0	1	2	3	4	5	6	7	8
0	0.0959 1.14(9)*	0.0980 1.88(8)	0.1003 1.85(7)	0.1026 7.9(6)	0.1051 3.4(6)	0.1076 ~1.5(6)	0.1102 <5.3(6)	0.1128 <3.0(6)	0.1156 <2.9(6)
1	0.0940 2.9(7)	0.0961 ~4.2(8)	0.0983 ~4.0(8)	0.1005 ~6.0(7)	0.1029 <6(7)	0.1053 ~5(7)	0.1077 ~3(8)	0.1103 <2.1(8)	0.1130 <1.0(8)
2	0.0921 2.1(7)	0.0941 2.5(8)	0.0962 2.8(8)	0.0984 ~9.3(7)	0.1006 ~9.3(7)	0.1029 <9(7)	0.1053 ~1.3(8)	0.1077 ~4.6(8)	0.1102 <3.2(8)
3	0.0904 1.11(8)	0.0923 1.2(8)	0.0943 ~5.7(8)	0.0964 6.1(8)	0.0985 3.4(8)	0.1007 4.7(7)‡	0.1030 <2(7)	0.1053 ~3.9(7)	0.1077 <5(7)
4	0.0887 2.43(8)	0.0905 ~1.5(8)	0.0925 ~9.7(6)	0.0945 ~3.37(8)	0.0965 ~2.9(8)	0.0986 ~2.8(8)	0.1008 ~1.04(8)‡	0.1030 <1(7)	0.1053 <1(7)
6	0.0856 1.63(8)	0.0874 2.0(8)	0.0891 <1.4(8)†	0.0910 <2(7)†	0.0929 2.0(8)	0.0948 4.35(8)	0.0968 <1.5(8)†	0.0989 2.84(8)	0.1010 2.5(8)‡

*Read as 1.14×10^9.

†Based on the upper limit value of the electron-impact emission cross section given in Table II of Ajello *et al.* (1989), less estimated contributions from overlapping features.

‡Based on a revised value of the electron-impact emission cross section, 0.55×10^{-19} cm^2 (Ajello, private communication, September 1990).

Table 38. Band head wavelengths and Einstein coefficients for N_2 $c_4'\ ^1\Sigma_u^+ - a\ ^1\Pi_g$. For each v'–v'' band, the listed quantities are $\lambda_{Hv'v''}$ (μm) and $A_{v'v''}$ (s^{-1}). Band heads from Lofthus and Krupenie (1977) (band origins not available). Einstein coefficients calculated from the electron-impact band intensities of Filippelli *et al.* (1984) relative to that of the c_4'–X 0-0 band of Ajello *et al.* (1989), normalized to the $A_{00}(c_4'$–$X)$ value of the latter.

$v' \setminus v''$	0	1	2	3	4	5
0	0.2827 1.98(6)*	0.2967 4.82(6)	0.3119 3.40(6)	0.3283 2.37(6)	0.3463 1.37(6)	0.3661 9.0(5)

*Read as 1.98×10^6.

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